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the Accounting Review

Quarterly Journal of the
AMERICAN ACCOUNTING ASSOCIATION

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Prem Prakash and Shyam Sunder

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The Case Against Separation of Current Operating Profit and Holding Gain

Prem Prakash and Shyam Sunder

ABSTRACT: Claims about the benefits to be derived from dichotomizing income into current operating profit (COP) and holding gain (HG) are examined in this article. Separability of an asset from the risk of change in its price is shown to be a necessary and sufficient condition for separate evaluation of the operating and holding decisions with respect to the asset. When risk is separable, the appropriate breakdown of income into operating and holding components is defined. When the risk is not separable, no meaningful breakdown is possible. Other claims for a COP-HG dichotomy, *e.g.*, the usefulness of COP in making various business decisions and interfirm and interperiod comparisons, are shown to be unjustified. In the absence of benefits, the direct cost of compiling data and the indirect cost from induced suboptimal decisions make the COP-HG dichotomy positively unattractive. The arbitrary nature of this dichotomy is illustrated through the construction of an equally defensible alternative.

THE proposal to report current-value income in two components, current operating profit (COP) and holding gain (HG), has received wide support. Edwards and Bell [1961] put together a detailed case in favor of the income dichotomy. Only a few arguments have been added to the case since then. Some arguments against the dichotomy have also been made [Drake and Dopuch, 1965], but the full case against the dichotomy has never been presented. The purpose of this paper is to offer a clear, concise, and reasonably complete statement of that case—recapitulating, as needed, the gist of the arguments already made in the literature, and adding several new arguments of our own. In some instances, our arguments may seem to be merely an echo of those already made by others, but a careful comparison will show that such an interpretation is obviously not valid, since we reach a different conclusion.

Our conclusion is unequivocal: There are no valid supports for the claim that the COP-HG dichotomy does, in fact, possess the benefits usually ascribed to it by its proponents (Section 2 of this paper). In fact, the dichotomy has a positive cost insofar as its use may lead to suboptimal decisions (Section 3). The dichotomy is artificial and arbitrary, and equally defensible (or indefensible) alternative schemes of decomposing income

We gratefully acknowledge the helpful comments of Professors Philip Bell, Jacob Birnberg, Raymond Chambers, Sidney Davidson, Nicholas Dopuch, Edgar Edwards, Robert Kaplan, Roman Weil, and participants in the accounting workshops at The Ohio State University, and the University of Pittsburgh. Of course, not all of these people agree with our arguments. Financial support for Sunder was provided by the National Science Foundation.

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can be readily constructed (Section 4).

Sections 2, 3, and 4, which constitute the core of the paper, are preceded by a brief review of current value accounting and the income dichotomy. This is to ensure that these two issues, which are often closely entangled in the literature, are kept separate. The results of our analysis are summarized in the concluding section.

SECTION 1.

CURRENT VALUATION AND THE INCOME DICHOTOMY

Current valuation is a relatively straightforward concept: (1) The *wealth* of a firm at any time is defined as the aggregate current dollar value of the firm's net assets; and (2) the *income* of the firm is defined as the change in wealth of the firm over the accounting period.[1]

The above definitions presuppose a resolution of the question of what qualifies as an asset and how the quantities of assets held by the firm are measured. The resolution of these questions, which are common to all methods of valuation, is not an issue here. Accordingly, we assume that they have already been appropriately settled.

Three corollaries of the definition of current valuation should be noted. First, in current valuation, the unit for measuring wealth is current dollars and not some measure of physical capital, such as plant capacity. This distinction is important because an increase in the specific price of plant capacity *increases* the current-dollar wealth of the firm but results in a *decrease* in the firm's wealth calculated in terms of the plant capacity.[2]

Second, the current-dollar wealth of the firm at any time depends only on the assets held by the firm at that time and their current values. The timing or the sequence of decisions by which the firm comes to have these assets is irrelevant.

Third, in measuring current value income, no distinction is drawn between the change in wealth resulting from the production and sale of the firm's product and that resulting from a change in the prices of the firm's assets. If a firm chooses not to return an increase in its wealth to its owners, then its wealth at the beginning of the succeeding period would be that much greater, the increase being in the form of expanded physical capital or increased value of the existing assets.

Edwards and Bell [1961], and many others after them, have advocated a breakdown of current-value income[3] into two main components: (1) *current operating profit* (defined as the excess of current revenue over the current replacement cost of services used in producing the revenue); and the remainder, (2) *realizable holding gain* (or *realizable cost saving*).[4]

> The business profit concept *requires* that operating profit be carefully distinguished

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[1] See Alexander [1950, p. 75] and Edwards and Bell [1961, p. 95]. Alexander gives his definition in terms of real purchasing power. Edwards and Bell use the term "business income" for income computed from current replacement values.

[2] A numerical example will illustrate. Consider a firm holding 10 units of plant capacity and 20 units of other assets; with current values of $20 and $10 per unit, respectively, the current-dollar wealth of the firm is $400. If all else remains the same and the current value of the plant capacity increases to $25/unit, the current-dollar wealth of the firm becomes $450, an *increase* of $50. In contrast, were plant capacity the unit of wealth, the wealth of the firm would be 20 units of plant capacity at the beginning and 18 units of plant capacity after the change in price—showing a *decrease* of two units.

[3] Edwards and Bell's "business profit" is the entry-value version of current-value income; it is not synonymous with the latter. However, for the purpose of evaluating the merits of income dichotomy, the distinction among various forms of current valuation, or even between current and historical valuation, is not important.

[4] Edwards and Bell [1961, p. 26] note that Schmidt [1929] argues for division of current value profit into three components: gains due to change in form (manufacturing), place (distribution), and vintage (holding) of assets. Paton's [1913] proposal for income dichotomy has been discussed in Zeff [1976, p. 7].

> from gains resulting from holding activities. [Edwards and Bell, 1961, p. 226] (Emphasis added.)

While the wealth of the firm at the beginning and end of the period is sufficient to determine its income for that period, it is not sufficient to determine the current operating profit or the holding gains. Information on the timing of sale transactions and purchase prices prevailing at the time of these transactions is also needed.

Neither the definition nor the implementation of current value accounting *requires* that income be dichotomized. Conversely, dichotomy of income is not unique to current valuation; historical cost income can also be broken down into two components—current operating profit and "realized holding gain." Thus, the dichotomization of income into COP and HG *is not a valuation issue*. Of course, the dichotomy may well have different interpretations in different systems of valuation, but an argument for or against a particular approach to valuation cannot, by itself, be regarded as an argument for or against the dichotomy.[5] Hence, the dichotomization of income must be argued on its own merits.

To eliminate any misunderstanding rooted purely in the valuation issue, we assume current valuation as the basis of accounting unless stated otherwise. Accordingly, our case against the income dichotomy should not be construed as a case against current valuation. Also, we assume[6] that a primary purpose of accounting information is to serve the evaluation function of both management and external users, thereby contributing to the managerial control of the firm as well as to the formulation of better future decisions by management and external users alike. Therefore, the differences between our conclusions and those of the proponents of the COP-HG dichotomy should not be attributed to a difference in the postulated goals of accounting information. Finally, to simplify exposition, we assume that the general price level remains constant; only the relative prices may change (this does not affect the generality of our arguments).

SECTION 2

EXAMINATION OF THE MERITS CLAIMED FOR THE INCOME DICHOTOMY

In this section, we present a detailed examination of the advantages commonly attributed to the COP-HG dichotomy, grouping them for convenience under the following six headings:

1. Evaluation of past performance
2. Aid to business decisions
3. Physical capital maintenance
4. Interperiod and interfirm comparisons
5. Taxation
6. Additional disclosure

Evaluation of Past Performance

The claim that the COP-HG dichotomy is useful for the evaluation of management's past holding and production decisions is based on the thesis that these two types of decisions are separate and independent, and that management has considerable freedom of choice with respect to each.[7] For instance:

> These two kinds of gains are *often* the result of quite *different* sets of decisions. The business firm *usually* has *considerable* freedom in deciding what quantity of assets to hold over time at any or all stages of the production process and what quantity of assets to commit to the production process itself. ... The difference between the forces motivating the business firm to make profit by one means

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[5] Also see Drake and Dopuch [1965, p. 193].

[6] See, for example, Edwards and Bell [1961, pp. 4–5].

[7] For a comparative review of two other statements of this argument, see Drake and Dopuch [1965, p. 195].

> rather than by another and the difference between the events on which the two methods of making profit depend require that the two kinds of gain be carefully separated if *the two types of decision* involved are to be meaningfully evaluated. [Edwards and Bell, 1961, p. 73], (Emphasis added.)

This thesis is effectively refuted by Drake and Dopuch [1965] and Chambers [1965]. Edwards [1975] and Bell [1975] agree that holding gain and operating gain may be intertwined. We shall not repeat their arguments; the interested reader should consult the above-mentioned references.

However, two basic questions remain: (1) What are the necessary and sufficient conditions for the independence of the production and holding decisions? and (2) What is the proper dichotomy for separate evaluation of the two types of decisions?

Characterization of independence of production and holding decisions. Consider a few situations in which the operating and holding decisions are truly independent of each other. One example is that of a broker who is engaged in the business of matching suppliers and customers and derives his income from commissions. It is not *necessary* to hold inventory in order to operate such a business. Accordingly, the holding decisions of the broker are truly independent of his operating decisions, and the COP-HG dichotomy is useful for evaluating the two types of decisions.

As a second example, consider a trader who buys and sells in different markets, at least one of which is liquid. Although this trader may hold inventory as an operational necessity, he needs to do so only for relativey short periods of time. A decision to hold long or short positions of inventory for extended periods of time is independent of the operating decisions and, once again, the income dichotomy is useful for evaluating the two types of decisions.

Or consider a merchant who holds inventory "on consignment," reserving the right to renegotiate the buying price at the time of sale. The merchant does not have to buy inventory outright. Any decision to do so is clearly independent of the operations of the business. In this case also, the income dichotomy is useful for an evaluation of the two types of decisions.

What makes the operating and holding decisions independent in the above examples is the fact that, in each instance, it is possible for the firm to hold the assets without also having to bear the economic risk of specific price changes. We call the economic risk of specific price changes "holding risk" and define it as being *separable* only if it is possible for the firm to hold the asset without having to bear its holding risk.[8] We then have the following necessary and sufficient condition: Operating and asset holding decisions are independent of each other *only in those* situations where the firm's operating assets carry a separable holding risk.

Most industrial corporations engaged in merchandising or manufacturing must hold inventory and fixed assets. The holding risk of such assets is often not separable because the opportunity to shift it to someone else is simply not available. The availability of plant and equipment on long-term lease does *not* imply that the holding risk of such assets is separable, for in long-term leases, the lessee takes over substantially *all* risks associated with the assets, including the risk of changes in specific prices. Whether the holding risk of the assets of the firm is separable depends on the type of business as well as the state of development of the relevant risk markets. For example, well-developed futures markets exist in the U.S. for many commodities and currencies, and managers have the opportunity to insulate the firm against holding losses or gains on these assets without affecting its operations.[9] In such instances, a decision to bear any holding risk is a purely speculative decision, and an appropriate income dichotomy may indeed be useful in making a separate evaluation of production and holding decisions.[10]

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[8] Note that the definition does not require that the asset-risk actually be transferred to someone else. For this reason, the question of whether firms try to shift diversifiable risk is not relevant to income dichotomy. Incidentally, there is some evidence that firms do try to shift the diversifiable risk through insurance buying and "hedging" behavior.

Having identified a necessary and sufficient condition for the independence of production and holding decisions, we now address the second question: What is an appropriate breakdown of income for evaluating the two decisions separately?

In constructing the income dichotomy, we must be careful to avoid two fallacies, the fallacy of timeless production and the fallacy of decomposed attributes. Had these fallacies been clearly recognized, a considerable amount of controversy about income dichotomy could have been avoided.

The fallacy of timeless production. To assume that production or "form change" occurs in a series of timeless stages, and to conclude that all gains due to the passage of time are attributable to holding activities independent of production is to commit what we call the "fallacy of timeless production." Production, or form change, is defined only with respect to time intervals, not timeless moments. The correct assumption is that *infinitesimally small changes* in form take place in *infinitesimally small intervals* of time—not in "timeless stages." Unlike the sum of timeless moments, which is always timeless, the sum of all infinitesimally small intervals needed for the total change in form is not negligible. The correct conclusion is that the total change of form takes place in a non-negligible "production time."

The fallacy of timeless production is closely related to Zeno's paradox: Consider an arrow released from a bow. At each timeless moment after it is released, the arrow is at some place in the air but not moving, for there can be no movement in zero time; yet in the totality of all timeless moments, the arrow moves from the bow to the target. So the arrow hits the target without moving. Here again, the fallacy is that movement or position change (like production or form change) is defined only with respect to time intervals and not timeless moments. That production does not take zero time is as obvious as the fact that an arrow does not reach its target in zero time. To assume that production takes place in a series of timeless stages is to assume away the time necessarily needed for production. When it is the hole of the donut that is in question, you cannot assume it away.

The fallacy of decomposed attributes. Once the fallacy of timeless production is recognized, it is immediately obvious that a production decision has two consequences: change in form and holding of assets needed to effect the change in form. To regard "holding decisions" as separate from "production decisions" is to treat two attributes of a single object of choice as if each attribute were an independent object, or to treat two consequences of a single decision as if each were the outcome of an independent decision. We call this the "fallacy of decomposed attributes." Let us illustrate this fallacy by two examples.

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[9] For example, a flour mill could buy spot wheat at four dollars per bushel and *fully* hedge by simultaneously selling a nine-month futures contract at $4.05 per bushel. Then the holding gain (loss) on selling the flour—as calculated according to Edwards and Bell [1961]—would be almost fully offset by the holding loss (gain) on the lifting of the hedge at the same time. The residual loss (if any) and commissions cost must be regarded as premiums which the flour mill has to pay to shift the holding risk to the speculators in the market.

[10] Note that Sterling [1970] confines his analysis to a wheat futures trader, a case very similar to the examples discussed above where assets carry a separable holding risk. Also see Nelson's remarks [1973] on Sterling's paper.

Suppose a grocer must buy his requirements of both cheese and milk from the same dairy. Then his choice among alternative dairies constitutes only one decision, with the objects of choice, the dairies, having two attributes related to the supply of cheese and milk, respectively. It would be fallacious to argue that the grocer faces two decisions, or that his decision should be evaluated separately with respect to each item, cheese and milk.

Next, consider the variable mix problem of a manufacturer who wishes to optimize the contribution margin from two products, A and B, subject to some resource constraints. Then, each product mix decision has two consequences, the contribution margins from products A and B, respectively. But both outcomes are the result of a single decision, namely, the *simultaneous* determination of the quantities of the two products, so it would be fallacious to argue that the manufacturer faces two decisions, or that the consequences of his decision should be evaluated separately.[11]

The proper breakdown of income. The income breakdown appropriate for separate evaluation of holding and operating decisions should then be:

(1) Holding component. This includes all gains (losses) on those assets of the firm whose holding risk the firm was not obliged to carry in order to conduct its operations. More specifically, the holding component consists of the following:
- —gains (losses) on speculative assets,
- —carrying cost of speculative assets,
- —gains (losses) on operating assets carrying separable risk,
- —saving of (imputed) risk premium on the separable risk which management chose to carry instead of shifting it to someone else.

(2) Operating component. This is the complement of the holding component, as defined above.

The income dichotomy proposed by Edwards and Bell [1961] is deficient in several respects. Their "holding gain" includes the effect of specific price changes on *all* assets, whether speculative or operating, and, in the case of operating assets, whether the holding risk is separable. They do not charge the cost of carrying the speculative assets to the holding gain component. They do not take into account the (imputed) risk premium which management is able to save by choosing to carry the separable risk (on operating assets) instead of shifting it to someone else. Finally, they specifically exclude from their computation of holding gains changes in labor costs on the specious ground that the current and historical costs of labor coincide [Edwards and Bell, 1961, p. 113]. To the extent that the timing of incurring labor cost is determined largely by operating considerations, gains on labor costs held in asset accounts are indeed a consequence of operating decisions, just as we have argued above for other operating assets. However, if, for speculative reasons, labor costs are incurred earlier or later than what is dictated by operating considerations, the related holding gains should also be excluded from the operating profits.

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[11] The fact that, at the optimum solution, the marginal effect of changing the quantity of each product is identifiable does not imply that the value of the objective function can be meaningfully divided between the two products.

Separation of gains on purely speculative assets has been advocated by Gordon [1963], Drake and Dopuch [1965, fn. 18], Gossett and Newlove [1965], and Burgert [1972].[12] More recently, Petri and Minch [1974] and Bell [1975] have explored the methods of isolating purely speculative assets from operating assets. We shall not repeat the details of their procedures here. It is sufficient to note that in order to isolate the two types of holding, one must delve into management's motivations and measure their expectations, all of which renders such an analysis too subjective to fulfill the requirements of external reporting, although it may well serve the purpose of internal evaluation.

A proper accounting of the (imputed) risk premium on separable risk is an issue which has not been considered in the literature on income breakdown. Procedures for measurement of risk premium need further investigation.

Aid to Business Decisions

It has been claimed that the COP-HG income dichotomy is helpful in making business decisions because (1) COP is indicative of the long-run profitability of the firm (2) alternative production processes can be (and ought to be) ranked for their economic desirability by reference to their COP; and (3) COP is a more *stable* predictor of the long-run profitability of the firm than historical-cost profit, so that using COP for making business decisions will lead to an increased stability at both the firm and the economy level. We believe that these claims are invalid.

As indicative of long-run profitability. The claim that COP measures the *current* profitability of the production process has been shown to be based on the fallacies of timeless production and decomposed attributes. In addition, it is not clear how the premise of current proceeds covering current factor costs can support the conclusion that the firm is profitable in the long run. We show that the connection between the premise and the conclusion is either false or trivial.

Edwards and Bell [1961, p. 99] state their position as follows:

> Current operating profit can be used for predictive purposes if the existing production process and the existing conditions under which that process is carried out are expected to continue into the future; *current operating profit then indicates the amount that the firm can expect to make in each period over the long run.* The assumption that production pro-

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[12] See, for example, Burgert [1972, p. 115]:

> In order to bridge the gap between the theoretically ideal situation and reality, the theory has been extended by recourse to the concept of "normal stock," that is, a stock of goods of such quantity that the company can be sure of being able to continue its production process without disturbance. Speculation occurs when real stock differs from normal stock.
>
> . . . [O]nly alterations in the value of normal stock are credited or debited to the "revaluation account." Price changes on a surplus or shortage of stock give rise to profits or losses from speculation, which are entered directly in the income statement.
>
> . . . It is implicitly assumed that the normal stock of a certain fixed asset, e.g., machinery, consists of a number of entirely new machines. As soon as a machine has been used for a certain period e.g., for a year, then there is a shortage of normal stock. . . . In periods of rising prices, such a shortage of normal stock leads to consequences comparable with a "loss by speculation." This loss is taken as such in the income statement under "additional (make-up) depreciation."
>
> . . . [T]he income statement for year 2, for instance, has to be charged with depreciation based on the replacement value at the end of that year and also for the "additional (make-up) depreciation" for year 1.

> cesses will not change is rather unrealistic, however. (Emphasis added.)

Vancil and Weil [1976, p. 58] take a similar position, using slightly different terminology:

> An important characteristic of distributable income from operations is that it is sustainable. If the world does not change, the company can maintain its physical capacity next year and have the same amount of distributable income that it had this year.

The "no change" assumption is crucial to the predictive ability or sustainability argument. Let us grant this "rather unrealistic" assumption and examine the content of the argument. Neither Edwards and Bell nor Vancil and Weil specify clearly what they mean by "continuation of existing conditions." One possible interpretation is continuation of existing technology and levels of prices and production of various goods and services. Under this interpretation there are no holding gains (see Drake and Dopuch [1965, p. 202]; current operating profit, total current value income and historical cost income are all equal, and current operating profit is therefore an empty construct. It is ironic that claims of merit for COP are based on precisely the same assumption which caused Edwards and Bell to criticize and reject historical cost accounting:

> To summarize, present accounting practices would be fully valid only if prices, quantities, and qualities of both factors and products were unchanging over time. . . . But this is a situation clearly akin to the stationary state. The certainty it implies bars by definition the very existence of profit as a return for bearing uncertainty. The implicit assumptions of accounting eliminate that which it has set out to measure! [1961, p. 9].

Alternatively, "continuation of existing conditions" may be taken to mean continuation of existing *rates of change* in technology, and in price and production-levels of goods and services. In this case, operating margins on individual goods and services will also change with time. Management will adapt to the changing circumstances by adjusting the operating plans and asset mix of the firm. In such a situation, current operating profit cannot be expected to remain stable or to change at a predictable rate *over the long run.* On the contrary, if the asset mix does not change too quickly (though it could, for instance, due to inventory liquidation), the holding gain may well be the more stable component of income when the rates of price change are constant. Thus, there is little basis for the conclusion that current operating profit will be useful for predictive purposes.

Consider now the second "more limited but realistic approach to the problem of prediction." It is claimed that, in the absence of specific expectations to the contrary, the *relative* current operating profits obtainable today from alternative production processes are indicative of relative current operating profits to be obtained in the future [Edwards and Bell, 1961, pp. 99–100]. This statement is empirically empty, for it is the logical sum of opposites; it is of the same form as, "Unless you specifically expect it not to rain, it will rain." The emptiness of the claim can be seen by noting that it extends equally to holding gains—in the absence of specific expectations to the contrary, the holding gains of this year are indicative of holding gains to be obtained in the future.

A third argument has been brought to our attention during discussions of this paper: If the firm were a monopoly or if it were to use a cost-plus pricing policy, current operating profit would be a good predictor of future income, since such pricing policy will maintain the *unit* margins. However, this argument ignores the basic economic fact that any firm can control its product price but not the quantity demanded at that price, and, therefore, even if the cost-plus pricing policy stabilized the unit margins, the *total* margins will remain dependent on the demand. Even given evidence that firms do engage in cost-plus pricing, predictability of COP does not follow from such a policy.

Evaluation or production processes. Let us examine, with the help of a numerical illustration, how the COP-based ranking might be used to choose among alternative production processes. A firm has \$100 in cash and faces a choice between two processes, A and B, with factor-bundle A costing \$10 per unit and factor-bundle B costing \$20 per unit. Assume that each production process takes exactly one year from the date of acquisition to the date of sale of products. *Purely* speculative holding of factors or products is not allowed, and all other outlays are the same for both processes. Which production process should the firm choose?

Horngren [1972] would have us make the decision by maximizing net *contribution margin.* For example, suppose the selling prices of products A and B which are expected to prevail one year from now are, with the same uncertainty, \$15/unit and \$28/unit, respectively. Then the choice is process A. (Its contribution margin $=\frac{\$100}{\$\ 10}\times(\$15-\$10)=\$50$ is more than the contribution margin of $\frac{\$100}{\$\ 20}\cdot(\$28-\$20)=\$40$ for B.) Horngren also instructs us that the current selling prices of products A or B, or the one-year-from-now cost of factor-bundle A or B is totally irrelevant for this decisions.

In contrast, Edwards and Bell would have us select the production process on the basis of the difference between current selling price and current factors cost to maximize the margin between one-year-from-now selling price and the *one-year-from-now* factors cost. This solution ignores the economic purpose of the case, which is to select the process having a greater margin between the one-year-from-now selling price and factors cost of today.

Edwards and Bell state that current operating profit is a useful measure for choosing among alternative production processes for the same product except when the prices of some factors go down and those of others increase [cf. 1961, pp. 99–100]. In other words, current operating profit is not useful in the all-important case of uncorrelated price changes. But, in these limited circumstances (*i.e.*, when current operating profit is useful), the economic choice among alternative processes can be made more directly simply by minimizing current factor costs; one does not need current operating profit to make such decisions. Under other circumstances—such as those in which the alternatives involve different products, uncorrelated price movements of products and factors of production, unequal production durations, unequal plant lives, and varying degrees of monopoly and monopsony—there is no guarantee that the production process presently yielding a larger current operating profit will also yield a larger current operating profit in the future. Indeed, Edwards [1977] agrees that expansion decisions should be made on the basis of *total* current income and not on COP.

In short, it is economically unsound to rank the processes by current operating profits, except in very special situations; and in these special situations, the ranking can be obtained more directly by using cost data.

Stability of current operating profit. Finally, consider the claims that (1) current operating profit is more stable than the reported accounting profit (*i.e.*, total income under historical cost valuation) and (2) "to the extent that operating activities [as opposed to holding activities] are fundamental to business activities, the stability of current operating profit relative to accounting (operating) profit would be likely to have a stabilizing effect on business decisions and on the economy as a whole" [Edwards and Bell, 1961, p. 229].

Edwards and Bell [1961, Table 13, p. 228; and Figure 8, p. 230] present estimates of current operating profit (COP) and historical cost profit (HCP) for the U.S. corporate sector for the years 1929–1949. From these data they conclude that the reported accounting profit *grossly exaggerates* both the magnitude and timing of fluctuations in current operating profit. Tables 1 and 2 present a summary of our statistical analysis of those data, as well as of the more up-to-date series for the years 1929–1974. Based on this analysis, we conclude that:

(1) The variability (measured by the coefficient of variation) of HCP and COP is almost equal. The coefficient of variation for one-period changes in COP is slightly higher than for the corresponding changes in HCP. The data do not support Edwards and Bell's assertion that the HCP "grossly exaggerates" the variability of COP.

(2) The correlation analysis presented in Table 2 confirms Edwards and Bell's observation that COP lagged behind HCP during 1929–1949. The implication of this observation, not mentioned by Edwards and Bell, is that the HCP of the previous period is a better instrument for predicting COP than the COP of the previous period. However, for the 1929–1974 data there is practically no difference in the predictive ability of COP and HCP.

(3) For 1929–1949, one-period change in HCP predicts the next year's change in COP better (correlation 0.77) than the change in COP predicts the change in COP (correlation 0.47). If COP is regarded as the object of prediction, HCP was clearly a better predictive instrument in the years 1929–1949, contrary to what Edwards and Bell conclude from those data. However, over the 46 years considered (1929–1974), changes in COP and HCP possess little predictive power (as can be seen in the data in the last four rows of Table 2).[13]

The above analysis should not be construed as advocating the use of historical cost accounting. It simply demonstrates that the income dichotomy and current operating profit fail to show the virtues of stability and predictive ability claimed for them.

Consider now the remaining part of the argument, that is, to the extent that operating activities (as opposed to holding activities) are fundamental to business activities, the use of COP for business decisions is likely to have a stabilizing effect at both the firm and the economy level. The stability of dynamic systems requires careful mathematical analysis and often defies intuitive reasoning. Furthermore, stability is a systemic property—it would be naive to believe that a complex system such as the U.S. economy is likely to become more stable if total business income, a variable endogenous to the system, were dichotomized into two components, one of which

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[13] For analysis at individual firm level, see Frank [1969]. Simulation studies such as Greenball's [1968a and 1968b] and Simmons and Gray [1969] only tell us us the characteristics of what the model assumes. The predictive ability issue is not to be settled by reference to simulations, but by reference to the real world whose events we wish to predict.

TABLE 1

VARIABILITY OF CURRENT OPERATING PROFIT (COP), HISTORICAL COST PROFIT (HCP) AND THEIR FIRST DIFFERENCES (ΔCOP, ΔHCP)
(in billions of dollars)

	COP		HCP		ΔCOP		ΔHCP	
	1929–49	1929–74	1929–49	1929–74	1929–49	1929–74	1929–49	1929–74
Standard Deviation	9.9	29.9	11.6	32.6	3.5	5.6	3.8	6.6
Mean	11.4	37.9	13.3	41.2	1.1	1.8	1.3	2.7
Coefficient of Variation	0.87	0.79	0.87	0.79	3.18	3.11	2.92	2.44

Sources and Notes: The data have been taken from *The National Income and Product Accounts of the U.S. 1929–74. Statistical Tables, Supplement to the Survey of Current Business*, U.S. Bureau of Economic Analysis, U.S. Department of Commerce, 1977. COP is "Corporate Profits with Inventory Valuation and Capital Consumption Adjustments" given in Table 6.18 of the source; HCP is "Corporate Profits Before Taxes," given in Table 6.18 of the same source. The data for 1929–49 used by Edwards and Bell [1961] have since been revised, but the results of the analysis for the unrevised data are the same as those shown above in all essential respects.

TABLE 2

PREDICTIVE ABILITY OF CURRENT OPERATING PROFIT (COP), HISTORICAL COST PROFIT (HCP), AND THEIR FIRST DIFFERENCES (ΔCOP, ΔHCP)*

	Simple Regression Model							
	Product Moment Correlation		*Root Mean^2 Difference*		*Standard Error of Residuals*		*R-Square*	
Levels of Variables	1929–49	1929–74	1929–49	1929–74	1929–49	1929–74	1929–49	1929–74
HCP_t as a predictor of COP_t	0.98	0.98	2.8	6.7	2.1	5.9	0.96	0.96
COP_t as a predictor of HCP_t	0.98	0.98	2.8	6.7	2.5	6.5	0.96	0.96
HCP_{t-1} as a predictor of HCP_t	0.94	0.98	4.1	6.6	4.2	6.3	0.88	0.96
HCP_{t-1} as a predictor of COP_t	0.97	0.97	2.9	6.9	2.6	7.0	0.94	0.95
COP_{t-1} as a predictor of COP_t	0.94	0.98	3.6	5.6	3.7	5.7	0.88	0.96
COP_{t-1} as a predictor of HCP_t	0.88	0.97	5.6	8.1	5.7	7.8	0.78	0.94
First Differences of Variables								
ΔHCP_t as a predictor of ΔCOP_t	0.78	0.73	2.4	4.6	2.2	3.9	0.64	0.54
ΔCOP_t as a predictor of ΔHCP_t	0.78	0.73	2.4	4.6	2.5	4.5	0.64	0.54
ΔHCP_{t-1} as a predictor of ΔHCP_t	0.32	0.22	4.5	8.1	3.8	6.5	0.10	0.05
ΔHCP_{t-1} as a predictor of ΔCOP_t	0.77	0.01	2.5	8.5	2.3	5.7	0.60	0.00
ΔCOP_{t-1} as a predictor of ΔCOP_t	0.47	0.10	3.7	7.5	3.2	5.7	0.22	0.01
ΔCOP_{t-1} as a predictor of ΔHCP_t	−0.03	0.16	5.4	7.8	4.0	6.5	0.00	0.02

* For sources and definitions of data, see footnote in Table 1.

is relatively stable, and business decisions were then based on the more stable component. Also, it is not clear why management, in its quest for enhancement of the firm's net wealth, should ignore the holding gain component of profit in making its decisions. In any case, the preceding analysis of aggregate data did not reveal any significant difference between the variability of the current operating profit and the historical cost profit.

We shall briefly discuss five defects in the arguments relating to the predictive ability of COP. First, since the process of enhancement of net wealth of the firm (*i.e.*, the "earnings process") is not captured in the firm's current operating profit series, but is captured in its total (current-value) business income series, the interesting questions are how well *business income* predicts itself, and whether current operating profit or some other construct enables us to predict business income better.

Second, it is fallacious to argue in favor of a dichotomy of income on the grounds that one of the components is more stable over time and predicts *itself* better. If this were the purpose of dichotomizing income, it could easily be accomplished by taking any arbitrary constant for one component of income and allowing the residual component to carry all the variability of business income. What makes a measure useful and theoretically significant is not whether it can predict itself, but the relationship it has to other measures and concepts, or its ability to predict values of other constructs which might be of substantive interest.[14] The case for income dichotomy must rest either on the merits of COP and HG as concepts of substantive interest in their own right or on their ability to predict values of other constructs of substantive interest. The COP-HG dichotomy fails on both these counts.

Third, there is an inherent contradiction in the arguments claiming predictive ability and long-run stability of current operating profit on one hand, and rejection of exit prices for valuation on the other. The uncertainty about whether and at what price the firm can sell its products to realize the operating margin is the basic justification for retaining the sales realization principle. If current operating profit is as stable as the proponents of the stability and predictive ability of COP would have us believe, why should one wait until the actual sale to count the current margin as part of income?

Fourth, the predictive ability argument for income dichotomy all but explicitly assumes that the temporal changes in prices of goods which lead to holding gains are somehow transient and unpredictable, while current operating margins are stable and predictable. In introducing income dichotomization, Edwards and Bell state,

> . . . the final profit reported according to present accounting procedures will be partly a result of holding activities and only partly a result of operating activity. The apparently favorable result of the production decision may lead the firm to make similar production decisions for the future. In this case, however, price changes may not occur, and gains from holding activities will not inflate reported operating profit. [1061, p. 74.]

This is too simplistic a characterization of the business environment. What guarantee can there be that the anticipated current operating profit will be realized?

Finally, predictive ability arguments overlook the economic mechanism underlying the market economy. Continual changes in the gross margins available to merchandisers and manufacturers constitute the fundamental mechanism of a free market for allocating productive resources. If management is unable to exercise some (monopoly) power over its product prices, it strives to increase its margin by technological innovation or by leaving the markets with tight margins and expanding into markets with better margins, this interindustry mobility being governed by technological considerations. Thus, *current operating profit is not a property of the production process*; rather *it is an outcome of the decisions of*

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[14] Also see Revsine [1973, p. 131] on this issue.

management in an interactive environment. The outcome may well be different from the one contemplated by management at the time the production decision is taken. The cobweb model of business cycles, the maturation delay of orange orchards leading to a ten-year cycle in the orange industry, and the gestation and growth period of hogs leading to a three-year cycle in the pork-belly business are examples of how management decisions of today, based on today's lucrative operating margins, can lay the grounds for a reduction of the operating margins of tomorrow when the goods in the pipeline become available.

In summary, there seems to be no foundation to the claim that COP can aid in making business decisions.

Physical Capital Maintenance and COP

Those who favor physical capital maintenance as the basis of measuring wealth have argued that COP is income itself and not merely a component of total income. COP has been referred to as distributable or sustainable income on the grounds that it is the amount which the firm can didtribute without impairing its physical capital.[15] A discussion of these arguments will take us deeper into the controversies surrounding valuation of assets, an issue we would like to avoid, restricting the present paper to the income dichotomy only.

The essence of the arguments against using the physical capital maintenance notion is that if the firm is viewed as a source of cash by its owners, its wealth should be measured and its income should be evaluated in terms of dollars, and not in terms of physical capital. The reader should consult the available well-known references for details.[16] We have only one comment to add.

The appeal of COP as the income allowing for physical capital maintenance makes sense in the context of national income and product accounting. For the economy as a whole, it is indeed proper to remove the effects of specific price changes in the calculation of total product or, symmetrically, total income, because specific price changes merely give rise to internal redistributions of wealth among economic agents. But, it seems to us, that at the level of individual economic agents (such as the firm), it does *not* make sense to calculate income using concepts such as physical capital maintenance, which ignore the redistributive effects of specific price changes.

[15] This use of concept goes back to TheodoreLimperg [1964, Part VI. p. 282, cited in Burgert [1972]] who called it "consumable income." Revsine [1973] uses "distributable operating flow" in several different meanings —as *ex ante* current value income [pp. 96–97], income under physical capacity maintenance rule [pp. 34, 97, 126], and current operating profit [p. 99]. More recently, Vancil and Weil [1976] have used the term "distributable or sustainable income," by which they clearly mean exactly the same as current operating profit. They prefer the term simply because it is more descriptive of their *normative* recommendation that COP should be viewed as distributable to the shareholders and the tax collector.

[16] In discussions of valuation problems, many references to "economic income" appeal to the authority of Hicks, leaving the impression (1) that there is consensus among economists on the definition of income, and (2) that Hicks himself settles on a clear statement of that definition. This is far from true. In fact, after a penetrating examination of the notions of income, savings, and depreciation, Hicks [1946, p. 171] arrives at the following conclusion:

> In spite of their familiarity, I do not believe they are suitable tools for any analysis which aims at logical precision. There is far too much equivocation in their meaning, equivocation which cannot be removed by most painstaking effort. At bottom, they are not logical categories at all; they are rough approximations. . . . But if we try to work with terms of this sort in the investigation we are here concerned with, we are putting upon them a weight of refinement they cannot bear.

A detailed discussion of the problem of defining income will take us too far from the main thrust of this paper. For an excellent discussion of the issues involved, see Sidney Alexander's "Income Measurement in a Dynamic Economy," in Alexander *et al.* [1950], Dopuch [1961, pp. 21–32] and Edwards [1961].

The income due to the redistributive effect of price changes is as far from being "illusory" as that due to the production activity itself. To view COP alone as the "true profit" of the firm is to confound the basis of national income and product accounts with that of firm-level accounts.

Interperiod and Interfirm Comparisons

We have already shown that unless the holding risk of the operating assets is separable, the holding gain on all assets necessary for the implementation of operating decisions is as much a consequence of the operating decisions as is the COP. The appropriate basis for making interperiod and interfirm comparisons of operating decisions is the operating component defined earlier in this paper.

Edwards and Bell have argued in favor of using current operating profit for interperiod and interfirm comparisons of efficiency. They present the following example of the usefulness of current operating profit for this purpose:

> A wise management enters an industry at a time when the necessary assets can be purchased at exceedingly favorable prices. As time passes, other firms enter the industry purchasing their assets at substantially higher prices. If all firms now in the industry are equally efficient in their operating activities, the first firm will record a substantially larger "operating profit" than the other firms in the industry. After all, the depreciation charges of the first firm are substantially lower in terms of historic cost than are those for the newer firms in the industry. But this excess does not result from the wisdom with which the management operates its assets; it is the result of the wisdom which the management displayed at the time it purchased the assets and in its many subsequent (perhaps passive) decisions to hold the asset. [Edwards and Bell, p. 224.]

Thus far, we have a straightforward argument in favor of current valuation instead of historical cost as the basis for accounting. Current valuation, it will be recalled, depends solely on the current state of the firm, irrespective of the history of events by which the firm arrives at that state. Accordingly, the business income of any period includes the effect of all economic events, and *only* those economic events, which transpire during the period. However, Edwards and Bell [1961] proceed to justify the dichotomy of business income:

> Suppose for example that the firm's managerial efficiency had deteriorated over time to the point where its reported operating profit was identical to that of the other firms in the industry. The inefficiency of the firm's operating activities would now be disguised by the gains realized through its holding activities. [p. 224.]

But the above is a *non sequitur* as far as the income dichotomy is concerned. In the above example, it is true that the inefficiency of the firm is disguised by the historical-cost income because holding gains which occurred in the earlier period are recognized in the present period. The correct conclusion is that all holding gains that occurred *in earlier periods* should be excluded from this period's profits. It does not follow that *all* holding gains, *i.e.*, holding gains of earlier periods *as well as of the current period*, should be excluded from this period's profit. The inefficiency of the firm in the example will be indicated by the firm's (current value basis) business income; it would be incorrect to base the comparison on current operating profit.

Drake and Dopuch [1965] argue that current operating profit is of limited use in comparing performance, primarily because valuation of each fixed asset requires the use of some specific price index. But the problem with the COP as a basis of performance comparisons is far more serious than the inaccuracy resulting from the use of specific price indexes instead of specific prices. In the absence of price changes, holding gain is zero and COP is identical to historical cost profit and business income. In the presence of price changes we have already shown that COP provides an incorrect basis of comparison. It is business income and not current operating profit which traces the progress of the firm as an earnings process; and, to be meaningful, comparisons of operating performance should be based on total business income less net gains on assets held for *purely speculative* reasons, with no distinction to be made for this purpose between inventories and fixed assets. *Only when* the holding risk of the assets held for production is separable should the holding gain on such assets be excluded in making operating comparisons. The appropriate breakdown to be used has already been presented.

Income Dichotomy and Taxation

Taxation is a matter of public policy, and tax laws cannot be seriously regarded as a basis for a theory of income, although a theory of income may form the basis for tax laws. The fact that, in the U.S. under the present tax law, taxable amount is called "taxable income" and capital gains and operating profits are treated differently is no justification for a theory of income in which income is broken down so that all holding gains are reckoned together regardless of whether they arise from *speculative* holding of assets or *productive* holding of assets.

The fairness of the tax system is a distribution issue, and no tax policy can be wholly neutral in its impact upon those concerned. To argue that a tax system based on current operating profit would be fairer than one based on, say, (current-value) business income requires an implicit assumption of what constitues fairness. In the COP-based tax system, those who enhance their net wealth through appreciation of asset values will escape taxation (wholely or partly) at the expense of those who gain economic wealth through productive transformations. So, the tax system will certainly not be *neutral* in its distributive effects.

In a recent paper, Edwards [1977] has shown that a tax system based on business income with no distinction between COP and HG is expansion-neutral in the sense that it does not affect the choice of the expansion path. As a matter of public policy, the government may or may not choose an expansion-neutral tax system. Financial accountants, whose job it is to serve the diverse needs of the society for business data, have little justification for jumping into the arena of macroeconomic policy making by trying to help pro-expansion or anti-expansion legislation.

Will a COP-based tax system result in lower taxes for the business sector? There is some evidence that the answer is not necessarily yes [Davidson and Weil, 1978]. In any case, the question has, at best, limited relevance to accounting theory. Taxation is an integral part of a country's fiscal policy. If the tax laws were revised to become COP-based for *all* businesses, then surely tax rates would also need to be adjusted in order to collect for the state a total tax revenue of about the same magnitude as that collected under existing laws. Unless the tax laws grant relief to one sector of the economy at the expense of another, tax advantages gained by changing the basis of taxation are largely redistributive within the particular sector. Whether the dichotomization of income will prove to be a useful device for persuading Congress to transfer the tax burden from the business to the household sector is not an issue of accounting theory and should probably be relegated to those concerned with lobbying and public relations.

Additional Disclosure

A final argument for an income dichotomy is that the information available under the dichotomy can be no less than the information provided by a single number, and, hence, there can be no disadvantage in reporting the details, for a user can always choose to ignore them. There are three objections to this argument.

First, as we show in Section 4, there are several ways of breaking down income, with corresponding interpretations of the components. The choice of one breakdown over all others must have some rational basis. The reasons advocated for the COP-HG dichotomy have been shown, on close and careful examination, to be indefensible.

Second, the argument that more detail means more information does not have a stopping rule—where do we stop in our pursuit of detail?

And, third, there is an asymmetry in the situation as seen from the information sender's viewpoint compared to the recipient's viewpoint. If the information sender were to disclose more detail than desired by the recipient, then the *sender's* argument would, indeed, be valid that extra detail does not subtract anything from the more condensed information—assuming that the sender also supplies the condensed version, thus avoiding the imposition of an information-processing burden on the recipient. But, if it is the recipient who demands more detail—and the COP-HG income dichotomy must be viewed from this perspective—then the *recipient* cannot support the argument that more detail is no worse than condensed information. The burden is on the recipient to show that the benefits of details desired by him outweigh the cost of making the details available.

SECTION 3

COST OF DICHOTOMIZING INCOME

In this section, we address the question of the cost of dichotomizing income. The proposition that the costs must be justified by the corresponding benefits can hardly be disputed. In Section 2, we examined the benefits usually attributed to the income dichotomy and found little direct empirical evidence or valid reasoning to support such claims. Are the costs of income dichotomy sufficiently small to be ignored?

The crucial issue here is what constitutes cost. Considered narrowly, the cost of income dichotomy is simply the incremental cost of compiling and reporting such information. This cost is probably small relative to the cost of the accounting system. But it could be sizable in absolute magnitude and, so, should not be summarily dismissed.

Considered more broadly, the cost of income dichotomy should include losses that may arise due to both information *use* and information *inductance*. Use of dichotomized income as advocated by its proponents could lead to suboptimal decisions by investors as well as managers. We have already argued that investment decisions should not be based on COP, for it is the total (current value) business income that measures the enhancement of the firm's wealth. If we turn now to management decisions, it is questionable in the first place how much control management can exercise over the COP and HG components separately. The effect of the dichotomy is to segment the target variable, income, by reference to factor costs at the time of sale, and management has little control over these costs. In the second place, most asset holding is an integral part of the operating plan, so the COP and HG components do not represent outcomes of independent decisions. An attempt to manage the two components separately, when in fact they are interdependent, can only lead to suboptimal planning, decision making, and control. The problem is analogous to the well-known problem of control in decentralized organizations.

There is another side to the consequences of income dichotomy in addition to the one related to its use. This is the side related to information inductance [Prakash and Rappaport, 1977]. The information issuer's own decision-making behavior may be affected by the information he is *required* to communicate. Inductance arises not because the issuer uses the information, but because he is concerned about how it might be used by the recipient and how such use might in turn affect him. Accordingly, the issuer alters his behavior or the description of his behavior to produce information closer to what he *believes* it ought to be. For instance, in the firm, the internal evaluation of managers, their compensation, bonuses, and perquisites, may all be tied to criteria based on measures generated by financial accounting. To managers, then, financial accounting rules are indeed "scoring" rules, and there is nothing irrational about their changing the operating and investment decisions to suit the scoring rules.

If financial information were to relate to inanimate objects, or to human beings who did not know that they were being measured or evaluated, there would be no information inductance. One could then accept the dictum that more detail obtained at zero cost of collection and communication can cause no harm, for the user of information can always choose to ignore the detail. This is the essence of the fineness theorem of Blackwell [1953]. But the dictum is not applicable to external accounting, where a human organization is *required* to communicate to external users some information relating to its own performance. If the firm were required to report income in a dichotomized manner, pressures would build for management to believe that it ought to control each component of business income separately. As stated earlier, exercising separate control on each component can only enhance the possibility of suboptimization of the total business income.

For the above reasons, the question of whether the COP-HG income dichotomy is useful must first be answered with a categorial "yes" before the dichotomy can be regarded as a viable alternative. And, in judging the desirability of dichotomized income, one must look at the problem from both sides, the user and the issuer of information, the use and inductance. We find the proposed income dichotomy undesirable on both counts.

SECTION 4

ALTERNATIVE INCOME DICHOTOMIES

In this section, we illustrate the arbitrariness of the COP-HG income dichotomy by constructing an alternative dichotomy and showing that the alternative is as descriptively valid, as feasible, and as defensible (or indefensible) as the COP-HG dichotomy.

Consider a merchandising operation, purchasing goods at time 1 when the purchase price is P_1 and the sale price is S_1, and selling them at time 2 when the prevailing purchase price is P_2 and the sale price is S_2. To keep the exposition simple, assume zero beginning and ending inventories. Then the firm's historical cost profit, business income (in the sense of Edwards and Bell), and exit value income (in the sense of Chambers) are all equal and can be referred to simply as "total income (TI)." This assumption serves to avoid any confusion between the attributes of valuation rules and income dichotomy. The following "holding gains" and "operating margins" can be constructed.

Holding gain on purchase price

$$\text{HPG} = P_2 - P$$

Holding gain on selling price

$$\text{HGS} = S_2 - S_1$$

Holding gain on operating margin

$$\text{HGOM} = (S_2 - P_2) - (S_1 - P_1)$$

Operating margin at purchase

$$\text{OMP} = S_1 - P_1$$

Operating margin at sale

$$\text{OMS} = S_2 - P_2$$

Operating margin "hybrid"

$$\text{OMH} = S_1 - P_2$$

Contribution margin or Total income

$$\text{CM or TI} = S_2 - P_1$$

In the COP-HG dichotomy, total income is broken down by inserting the purchase price P_2 prevailing at the time of sale in the following manner:

$$\text{TI} = (S_2 - P_2) + (P_2 - P_1). \qquad (1)$$

A symmetrical dichotomy is obtained if, instead of inserting the purchase price at the time of sale, we insert in the expression for total income the *sale price S_1 at the time of purchase:*

$$\text{TI} = (S_2 - S_1) + (S_1 - P_1). \qquad (2)$$

Before proceeding further, let us check the descriptive validity of the alternative dichotomy, $(S_2 - P_1)$ is the operating margin at the time that management makes the decision to commit resources to implement a particular operating decision; $(S_1 - S_1)$ is the gain or loss that comes about due to the fact that the economic circumstances are different at the actual time of sale. Also note that the alternative dichotomy is feasible. For products with established markets, the sequence of selling prices can easily be traced, and S_1 is readily available. For products introduced into the market for the first time, there are some problems of implementation, problems which are not unlike the ones which arise in the case of the COP-HG dichotomy when complete markets do not exist for factors of production.

Let us now consider briefly whether it is possible to make a case for the usefulness of the alternative dichotomy. Certainly, the operating margin at the time of purchase is much closer to the operating decision than the margin realized at the time of sale. The operating margin at the time of purchase can be "controlled" by management for example, by choosing to enter or not to enter the market. In contrast, operating margin at the time of sale *cannot* be controlled by management. Further, it is often claimed that today's operating margins are the numbers to be used both for evaluating alternative production processes and taking future decisions. (Of course, we have argued against this position, but let us see where it takes us.) Since information concerning expectational errors is essential for improving the decision-making process, it seems quite reasonable that the business income of the firm be dichotomized into components, (1) operating margin at the time of making the operating decisions, and (2) the (residual) holding gain on sales, representing the change in selling price during the time required for production.

This alternative dichotomy even has the virtue that the two components are independent of each other. The holding gain on sales represents the effectiveness of management in foreseeing where the selling prices are headed in the future (and in exercising monopoly power if it exists). To be sure, a negative holding gain on sales is not to be construed as necessarily bad, for management might have anticipated it and taken it into consideration while making the operating decisions. However, if the current-value-basis rate of return (*i.e.*, business income as a proportion of net wealth) were to fall below some norm, then a negative holding gain clearly would indicate mistaken expectations. Thus the alternative income dichotomy is quite useful for (comparative) evaluation of firms, especially in conjunction with the information contained in the total business income.

Finally, note that the total income (S_2-P_1) can be expressed in terms of any of the other *three* operating margins by appropriately using two of the three holding gains defined earlier:

$$\begin{aligned} \text{TI} &= \underset{\text{OMP}}{(S_1 - P_1)} + \underset{\text{HGOM}}{\{(S_2 - P_2) - (S_1 - P_1)\}} + \underset{\text{HGP}}{(P_2 - P_1)} && (3) \\ &= \underset{\text{OMS}}{(S_2 - P_2)} - \underset{\text{HGOM}}{\{(S_2 - P_2) - (S_1 - P_1)\}} + \underset{\text{HGS}}{(S_2 - S_1)} && (4) \\ &= \underset{\text{OMH}}{(S_1 - P_2)} + \underset{\text{HGP}}{(P_2 - P_1)} + \underset{\text{HGS}}{(S_2 - S_1)} && (5) \end{aligned}$$

A simple examination of (3) and (4) shows that, for each, if the middle term HGOM (=holding gain on operating margin) were merged with the corresponding "operating margin" term on its left, we would get one of the dichotomies under discussion, and if the middle term were merged with the term on the right, we would get the other. We cannot think of any convincing reason why the middle term should be merged with the term on one side rather than with the term on the other side, or, for that matter, why it should not be left as a trichotomy. Can any one trichotomy be defended?

SECTION 5

SUMMARY: THE CASE AGAINST THE INCOME DICHOTOMY

The COP-HG income dichotomy is commonly acclaimed to have several benefits. It is now well understood in the literature that the operating and holding activities of the firm, whose outcomes COP and HG purport to measure, are in general not independent activities. We have shown that for the two activities to be independent, it is necessary and sufficient that the holding risks of the firm's assets be *separable*; that is, it should be possible for the firm to hold the assets without also having to carry the economic risk of specific price changes. It is fallacious to argue independence of the two activities by assuming timeless production. Furthermore, when the two activities are not independent, it is fallacious to argue that it is possible meaningfully to disaggregate the outcomes of what is clearly a joint decision.

When the holding risk of the firm's assets is separable, the management is indeed free to choose whether to carry the risk independently of the operating decision to hold the assets. The proper income dichotomy in such cases is not the one proposed by Edwards and Bell. Instead, the (imputed) risk premium which the management is able to save by choosing to carry the separable risk should be charged against the current operating profit and credited to the holding gain. Ideally, a distinction also should be drawn between assets held for purely speculative reasons and those held for operating reasons. And, in all of the above, changes in the labor cost should be treated no differently from those for other factors of production, and should not be excluded from the computation of holding gains as suggested by Edwards and Bell.

For the case when the asset risk is not separable, we examined the claimed benefits and possible costs of the COP-HG dichotomy. First, in regard to benefits, we showed that there is no valid reason or empirical evidence to support the claim that COP is a better indicator of the long-run profitability of the firm than the total current value income, that COP is the appropriate index for ranking the production processes according to their economic desirability, or that COP is a more stable predictor of the long-run profitability of the firm than the historical cost profit. For this reason, COP is not valuable in making inter-period or interfirm comparisons. The appeal of COP as the income which allows for physical capital maintenance is of no consequence if the focus is on the firm and not on the national economy. Specific price changes are significant in accounting for the firm, because a change in wealth due to the redistributive effects of price changes is as far from being "illusory" as is a change in wealth due to production activity itself. Some have argued in favor of the dichotomy on the grounds that, for purposes of taxation, it is desirable to have a disaggregation of the total wealth change into that due to the redistributive effects of specific price changes and that due to production activity. But, surely, taxation cannot provide a justification for a theory of income or its breakdown for purposes of financial reporting.

Turning to the cost of the dichotomy, we argued that the cost must include not only the incremental cost of compiling and reporting the dichotomy, but also the loss associated with suboptimal decision behavior that may result from the use of the dichotomized information, as well as from the inductance effects on management due to a required reporting of the dichotomy. The claim that there is no consequential cost attached to reporting the dichotomy because the recipient of information can always choose to ignore it is false. This claim (and its associated mathematical proof) is based on the assumption that alternative information requirements will have no inductance effect on the issuers of information—an assumption that cannot be defended in the case of financial reporting.

Finally, we showed the arbitrariness of the COP-HG dichotomy by dichotomizing income in an alternative way: (1) operating margin at the time of purchase and (2) the holding gain on the sale price. We showed that this second dichotomy is as descriptively valid, feasible, and defensible (or indefensible) as the COP-HG dichotomy.

In closing, it should be noted that descriptive validity and feasibility of implementation, while necessary, are not sufficient in themselves to recommend the adoption of any particular scheme for financial reporting. Financial accounting is a pragmatic activity; and the merits of suggested accounting procedures need to be judged on the basis of their usefulness commensurate with their cost. It is this acid test that the COP-HG dichotomy fails.

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Demand for Social Responsibility Information by University Investors

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ABSTRACT: This paper presents the results of a mail questionnaire survey of 500 university chief financial officers. The survey attempted to assess the demand for and importance of nine social items of information to universities as investors. Despite the available literature which suggests a growing demand by universities for external corporate social responsibility reporting, the authors advance the tentative conclusion, based on their analysis of 292 usable returns, that university investors may not be a strong source of demand for information about social responsibility.

SEVERAL accountants, as well as a number of non-accountants, have suggested that the accounting profession should expand the contemporary accounting measurement and disclosure model to encompass corporate social responsibility reporting. The advocates of the suggested disclosure expansion cite various sources of evidence in support of their contention that there is now a sufficient demand for corporate social responsibility reporting. Universities represent one of the commonly cited sources of demand. However, there is also some evidence which tends to indicate that interest in corporate social responsibility reporting may not be as widespread as some writers would have us believe. In particular, there is reason to believe that universities as investors may not be a strong source of demand. Therefore, the primary purpose of the study reported in this paper was to examine several questions related to the potential demand by university investors, for information on corporate activities in nine selected areas of social concern.

In order to examine the issue of potential demand for information related to nine selected social responsibility activity areas, we mailed a questionnaire to a random sample of 500 university chief financial officers. A total of 306 questionnaires were returned of which 292 were usable in our study for the purpose of classifying our responding universities by their investment management practices. After eliminating those universities that could not or did not exercise control over their investable funds, we were left with 132 responding universities that could and did exercise such control. For these 132 respondents we collected four types of investor-oriented data on each of nine potential areas of social concern. The four types of data collected were:

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a. perceptions of information availability,
b. perceived relative importance for investment decisions,
c. current investment policies, and
d. willingness to incur a financial cost for unaudited and audited information.

The remainder of this paper is organized as follows. First we discuss the background and rationale for our study. Next, the nature of the survey is described. Then, we present our survey results under the following six headings: (1) investment practices, (2) availability, (3) relative importance, (4) investment policies, (5) unaudited versus audited information, and (6) summary preference ordering of the nine social items of information. The final section contains a summary of the study and our conclusions.

BACKGROUND AND RATIONALE FOR THE STUDY

It appears that several segments of society are now demanding that corporations assume a larger role in advancing a number of social goals [*e.g.*, Sethi, 1975]. In addition to the demands that corporations act in a more socially responsible manner, there also appears to be a developing demand for increased disclosure by corporations with respect to their activities in areas of social concern. Evidence of the potential interest in disclosure can be found in the fact that many of the shareholder proxy campaigns involve at least one question concerning disclosure [Longstreth and Rosenbloom, 1973]. Additional support for disclosure has been provided by Shapiro [1972, p. 81], who reported that many foundations in voting their shares, have "shown much more enthusiasm for proposals requiring disclosure of information on controversial corporate activities than for proposals dealing with the activities themselves."

The potential interest in disclosure is also illustrated by the fact that a federal district court ordered the Securities and Exchange Commission (SEC) to hold hearings "to consider how much interest 'ethical investors,' such as churches and universities have 'in the type of information' the public interest groups have requested" [*The Wall Street Journal*, 1974]. The hearings began on April 14, 1975, and have resulted in requirements that firms disclose more data on the impact of environmental legislation [*The Wall Street Journal*, 1975]. Numerous other sources of evidence which support the existence of a potential demand for corporate social responsibility reporting are summarized elsewhere in the literature [*e.g.*, Estes, 1976].

Given the available evidence offered in support of an increasing demand for corporate social responsibility reporting, it is not surprising that some accountants believe that "it is apparent that the issue of external reporting of corporate social performance is building up a head of steam" [Dilley, 1975]. Several accountants have suggested that the accounting profession should become involved with corporate social responsibility reporting [*e.g.*, Estes, 1972; Linowes, 1972; Tipgos, 1976]. Additional evidence of the accounting profession's growing awareness of the potential need for involvement in social responsibility reporting can be found in the American Accounting Association's Report of the Committee on Social Costs [1975] and the AICPA's Report of the Study Group on the Objectives of Financial Statements [1973, pp. 53–55].

While we believe that the available evidence is sufficient to warrant a continued investigation into the relative merits of social responsibility reporting, it is our opinion that the evidence is not sufficient to support a conclusion at this time that there is widespread interest in social responsibility reporting. Our position stems in part from the fact that much of the literature in the area of social responsibility is basically normative in nature. Relatively little empirical research has been generated to support the normative arguments advanced in the literature. Also, there is some empirical evidence which indicates that major segments of shareholders are not very interested in such information. For example, a review of the outcomes of 58 socially oriented proxy resolutions submitted to shareholders in 1974 indicates that of those shareholders who voted their shares, relatively few supported the resolutions, many of which involved disclosure issues. Forty-four (76 percent) of the resolutions failed to receive as much as five percent of the vote. Only three (five percent) of the resolutions received more than ten percent of the vote [Corporate Information Center, 1974].

Further evidence on the lack of agreement concerning the desirability of social responsibility reporting can be found in a survey of ten different groups with a potential interest in financial statements. The survey was performed by Opinion Research Corporation [1974] and covered a wide variety of questions related to the role of independent accountants and the corporate reporting controversy. One question [p. 64] asked, "What is the proper role of the accounting profession in terms of advocacy and encouragement of corporate social auditing?" An analysis of the answers led the researchers to conclude that:

> There is much wider agreement among key publics on the issue of what the proper role of the accounting profession should be with respect to the advocacy and encouragement of corporate social accounting. The findings suggest that having the accounting profession play an active role in this area is an idea which is popular only in academic circles and among corporate social activists [p. 53–54].

The conclusion arrived at by Opinion Research Corporation is echoed by Duff and Phelps Inc. [1976]. In a report prepared for Arthur Andersen & Co., Duff and Phelps concluded that:

> The question for the corporate reporting system is whether these matters are relevant to investors' needs. If not, are they unfairly burdening the system with unnecessary information?... It is our observation, however, that much of the information disclosed is disregarded by investors as immaterial to investment decisions [p. 49].

We believe that the questions raised in this section dictate that additional empirical research may be needed in order to ascertain the relative importance of different types of social responsibility data to various potential user groups. In essence, then, we agree with Epstein, *et al.* [1976, p. 35] who pointed out that "we need to know more about... the audiences to which social accounting reports are being addressed." Therefore, we examined the demand for and relative importance of nine different types of socially oriented information items to a group of investors, *i.e.*, universities.

A number of interrelated reasons led us to select universities as our target group. First, we were interested in assessing demand from the standpoint of investors, because investors are often mentioned as one of the primary targets of external financial statements [*e.g.*, FASB, 1976, p. 3]. Thus, groups that did not have a primary investment demand for the information (*e.g.*, some public interest groups) were ruled out.

Second, there is some reason to believe that universities are concerned about corporate social responsibility [*e.g.*, Bowman, 1971; Malkiel and Quandt, 1971].

Hence, universities might be predisposed to use corporate social responsibility information in their investment decisions. In essence, we were attempting to use our scarce resources to maximize the probability of finding a group with a demand for corporate social responsibility reporting. Third, universities represented an institution for which it was possible to identify the individual elements of a potential sampling frame, *i.e.*, the persons involved in the investment decision process.

A fourth reason behind our selection of universities was that they were one of the groups of specific interest to the SEC in its 1975 hearings on social responsibility reporting [*The Wall Street Journal*, 1974]. Fifth, universities are cited by some of the proponents of corporate social responsibility reporting as a strong source of demand for social responsibility information. For example, Estes [1976, p. 8] states that "large universities make very substantial investments, and many are seeking social performance information as a routine part of the evaluation process."

Finally, in contrast to the indicators cited above which tend to show that university investors may be a source of demand for corporate social performance information, there is some limited evidence which supports an alternative view. Longstreth and Rosenbloom [1973] contacted 28 large universities concerning their interest in corporate social responsibility. Based on an analysis of 22 responses, they concluded that:

> Universities expressed a belief that their institutional purposes and the financial requirements for pursuing such purposes impose serious limitations on the degree to which they can and should take social considerations into account in their investment policies [p. 49].

In summary, there appears to be a relatively popular tendency to point to university investors as a source (or at least a potential source) of demand for corporate social performance data. However, there is some evidence which tends to contradict the preceding notion. Unfortunately, this evidence is limited in that it is based on only one study and the sample was quite small and non-random. Therefore, we undertook our study in order to help clarify the extent of university investor demand for corporate social performance information. Furthermore, our examination went beyond the assessment of general interest in social responsibility reporting by considering interest in specific social responsibility topics. We felt that a topical approach would provide more specific guidance to policy makers and others interested in the potential advisibility of disclosure by corporations of their social responsiveness.

The data for our project were collected by use of a mailed questionnaire. The nature of our survey and the specific types of information collected are described in the next section of this paper.

THE NATURE OF OUR SURVEY

Questionnaire Contents, Sample, and Response Rate

Our university questionnaire contained five questions.[1] The first question was used to determine the extent to which the universities managed their own investments or provided guidance to an external investment manager. Each of the remaining four questions dealt with a set of nine potential social reporting topics, *e.g.*, pollution, minority hiring, and illegal payments (see Table 2 for a complete list of the topics). Selection of the topics was based on our perception of the frequency of their mention in the literature dealing with corporate social responsibility and the result of a pilot study program conducted by us. Questions 2 through 5 collected the following four types of information:

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[1] A copy of the questionnaire is available upon request for either examination or replication purposes.

2. Perceptions of the current availability of information on corporate involvement in each of the nine social topic areas.
3. Perceived relative importance to investment decisions of information on each of the social topics. The nine social topics were interspersed among six standard financial reporting information items.
4. For each of the nine social topics, current policy regarding investment in companies negatively engaged in each topic.
5. For each of the nine social topics, willingness to incur a financial cost for unaudited and audited information.

An initial draft of the questionnaire was pilot-tested on a random sample of 50 university chief financial officers. The pilot sample was drawn from the same population used for the main study.[2] The final form of the questionnaire was mailed to 500 university chief financial officers drawn at random from the National Association of College and University Business Officers' (NACUBO) mailing list. Since 12 of the questionnaires were returned as "non-deliverable," a maximum of 488 questionnaires were delivered to the addressees. Each member of the original sample (minus the first mailing non-deliverables) was sent a second copy of the questionnaire approximately two weeks after the first mailing. A total of 306 questionnaires were returned (excluding those returned as "non-deliverable") for an overall, delivered response rate (returned÷delivered) of 62.7 percent. Fourteen of the returned questionnaires were not usable, leaving us with 292 usable responses and a usable, delivered response rate of 59.8 percent.[3]

Consideration of Non-response Bias

Given the magnitude of our non-response rate (37.3 percent), we attempted to examine our data for non-response bias. Our non-response bias test was based on what has been called the "early/late hypothesis." The early/late hypothesis suggests that late respondents are sometimes roughly similar to non-respondents [*e.g.*, Pace, 1939; Ferber, 1948; Oppenheim, 1966, p. 36].

Our test consisted of a comparison of the response distributions for a random sample of 21 questionnaires from the first mailing with the distributions for the last 21 questionnaires received in the second mailing,[4] for each of the nine social reporting topics within each of the questions 2 through 5. Since question 3 on relative importance contained 15 items of information, the nine social topics plus six standard financial items, and question 5 required responses on both an unaudited and audited basis, a total of 51 individual tests were conducted for significant differences between the distributions for the sample of first mailing questionnaires and the distributions for the last 21 questionnaires from the second mailing, based on the calculation of Mann-Whitney U values.

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[2] A second pilot test was conducted on a sample of 30 chief financial officers in order to validate the changes made to the questionnaire as a result of our analysis of the responses to the initial pilot test.

[3] The ability to achieve a gross response rate of 62.7 percent probably resulted, at least in part, from the fact that NACUBO granted us permission to use their endorsement of our survey in our cover letter to the universities. It should be pointed out that NACUBO did not sponsor our study. Rather, upon our request, they reviewed our proposed questionnaire and then granted us permission to use their endorsement. Therefore, the purpose, content, conclusions, and any possible errors and omissions of this study are the sole responsibilities of the authors.

[4] The 21 second-mailing questionnaires represented all of the returns received during the final return period, *i.e.*, the period represented by a substantial decrease in the daily response rates.

The test results indicated that 13 of the 51 response distributions were significantly different at an alpha of 0.05. Thus, this test provides evidence indicative of a bias in several of the item response scores. Furthermore, an examination of the mean differences between the two mailing subsamples indicates that the potential bias may be negative for ten of the 13 items with statistically significant differences. That is, the response scores for these ten items may be too low with respect to the 100-percent sample response means implied by the trend from the first to the second mailing. Thus, our sample of respondents may contain an above-average representation of universities with an interest in several of our study's nine social items of information.

A few additional comments are needed in order to interpret the preceding results. First, it should be pointed out that a non-significant (significant) difference between the first and second-wave mailings should not be considered as conclusive evidence of a lack (presence) of non-response bias, since some studies have found that late respondents are not always similar to non-respondents [e.g., Ellis, *et al.*, 1970]. Second, as pointed out by Ferber [1948], one of the problems with the use of the early/late hypothesis is in the determination of what constitutes a sufficiently late return. Thus, our results may be dependent on our definition of lateness.

In essence, then, our test results do not provide conclusive evidence regarding the lack or presence of non-response bias. However, as Scott [1961, p. 164] has pointed out, based on his extensive review of the available evidence, the use of the early/late hypothesis is beneficial more often than not. Also, an analysis of an extensive number of studies in which there were variables with a known bias indicated that the use of the early/late hypothesis in predicting the direction for the biased items was "superior to chance in all respects" [Armstrong and Overton, 1977, p. 399]. Thus, while there is reason to caution the reader against an excessive reliance on the results of our test, it seems reasonable to state that the test should provide a useful indicator of non-response bias more often than not.

In our subsequent tables we indicate the 13 items from our test for which we found significant differences.[5] The ten items which exhibited a potential negative bias, *i.e.*, the reported response means may be understated, are shown by superscripted minus (−) signs. Conversely, the three items which exhibited a potential positive bias are shown by superscripted plus (+) signs.

SURVEY RESULTS

Investment Management Practices of Universities

Based on the results of our pilot test, it was obvious that a significant number of universities could not or did not exercise control over their investments. Therefore, we asked our respondents to indicate their university's investment management practices for their intermediate to long-term investable funds. The results for this question are presented in Table 1.

The contents of Table 1 reveal that 44 (15.0 percent) of our responding uni-

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[5] It should be pointed out that given our large number of individual significance tests, we would expect from two to three of the tests to show significance solely by chance. Hence, the relevance of a particular significant difference is difficult to interpret.

TABLE 1

INVESTMENT MANAGEMENT PRACTICES OF UNIVERSITIES

	Response Frequencies	*Percent of Total Responses*
a. We manage our own investments.	64	21.8
b. We do not manage our own investments but we provide our external manager (*e.g.*, a bank trust department) with specific guidelines regarding our investment policies.	58	19.7
c. We do not manage our own investments and we do not provide our external manager with specific guidelines. However, we are currently considering the need for a set of future guidelines.	10	3.4
d. We do not manage our own investments, do not provide our external manager with specific guidelines, and we are not currently considering the need for a set of future guidelines.	116	40.1
e. Law restricts our investments to certificates of deposit and/or government securities.	44	15.0
	292	100.0

versities could not by law invest in corporate securities. In essence, then, the potential interest of these universities in corporate social responsibility reporting should be classified as that of an institutional citizen rather than as that of an institutional investor.

In interpreting response categories *a–d* in Table 1, it should be mentioned that these categories may not be mutually exclusive with respect to some of the responding universities. The results of our pilot test tended to indicate that the investment management practice categories identified in Table 1 would be mutually exclusive. Also, we did not detect any material indications in the actual results that these categories were not mutually exclusive. However, our retrospective consideration of this question led us to the recognition (per the suggestion of a reviewer) that it is still possible that some of the responding universities may manage one part of their investments, while using external managers for the other part. Thus, some of the responses may represent the "typical" practice for some of the universities, *i.e.*, the practice applicable only to the majority of its long-term investments. Therefore, the responses to categories *a–d* may be, to a degree, best viewed as a representation of the predominant practices for some of the respondents.

In effect, category *d* tends to indicate that there is a significant number of universities that do not provide policy guidelines to their external managers. It should be noted that the preceding observation is subject to the qualification that category *d* may contain some state universities who by law cannot accumulate or invest long-term capital funds. Unfortunately, our questionnaire does not permit us to identify universities who are part of state systems. To the extent that such respondents selected category *d*, these results are overstated. However, this set of respondents, members of state university systems who by law cannot

TABLE 2

AVAILABILITY, RELATIVE IMPORTANCE, AND UNAUDITED VS. AUDITED MEAN RESPONSE SCORES

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			Relative Importance			*Unaudited Vs. Audited Interest Scores*			
	Availability					*Unaudited*		*Audited*	
Information Related To:	*Mean*	*Rank*	*Mean*	*Rank All Items*	*Rank: Social Items Only*	*Mean Scores*	*Rank*	*Mean Scores*	*Rank*
1. The firm's involvement in improper or illegal business or political practices such as contributions and bribes.	3.53	9	2.23^{-}	4	1	4.12	1	2.99	1
2. Equal opportunity employment practices of the firm.	2.98	3	2.77	8	2	4.39	3	3.71	2
3. The firm's sale of tobacco or alcoholic beverages.	2.24	1	3.23	14	8	4.57	5	4.23^{+}	6
4. The firm's sale of products, other than tobacco or alcoholic beverages, which are potentially hazardous to human health and safety (e.g., inadequately tested drugs and highly flammable clothing).	3.26	6	2.82	9	3	4.33^{-}	2	3.91	3
5. Pollution of the environment by the firm (e.g., air, water, and noise).	3.14^{+}	4	2.92	10	4	4.54	4	4.04^{+}	4
6. Business activities of the firm in countries with limited civil rights.	3.17	5	3.11	13	7	4.59	6	4.07	5
7. Other nonpollution-related environmental issues such as the destruction of scenic beauty.	3.42^{+}	8	3.04	12	6	4.60	7	4.26	7
8. The firm's involvement in the sale of military equipment.	2.77	2	2.98^{+}	11	5	4.68	9	4.35	9
9. The firm's charitable contributions.	3.34	7	3.35^{+}	15	9	4.61^{+}	8	4.28^{+}	8
10. The leasing of assets (firm is the lessee).			2.71	7					
11. The firm's stock option plan.			2.56	6					
12. Breakdown of tangible assets into a form such as land, equipment and buildings.			2.38	5					
13. Explanation (reconciliation of the calculation of primary and fully diluted earnings per share.			2.19	3					
14. The firm's forecast of next year's earnings per share.			2.05	1					
15. Changes in accounting methods.			2.05^{+}	1					

NOTE: A superscripted minus (−) sign for a mean indicates a potential negative bias; i.e., the mean may be understated.
A superscripted plus (+) sign for a mean indicates a potential positive bias; i.e., the mean may be overstated.

invest long-term funds, have little impact on the placement of investable funds. Consequently, they have little demand for information on social responsibility activities.

Since we were primarily interested in active investor policies and perceptions, we instructed those universities who checked items *d* and *e* to return the questionnaire without completing the remaining questions. While those universities who checked item *c* did not provide investment guidelines to their external managers, we requested that they complete the questionnaire, because they were actively engaged in considering a set of guidelines. Therefore, the remaining sections of this paper are based on analyses of the responses of the 132 universities who checked items *a*, *b*, or *c*.[6]

Information Availability

We asked our respondents to indicate their perceptions of the current availability of information about the involvement of publicly traded companies in each of our nine social activities by assigning a code number to each activity from the following scale: 5 = none, 4 = very little, 3 = little, 2 = moderate, and 1 = sufficient. The resulting mean availability ratings and their accompanying ranks are presented in columns 2 and 3 of Table 2.

With respect to the mean availability scores in Table 2, it is not surprising that information relating to the sale of tobacco and alcoholic beverages (item 3) and military equipment (item 8) were viewed as relatively more available than that for the remaining seven items. Elements of information relating to these two items have long been part of standard financial reporting. However, even for these two items, availability is viewed as somewhat less than moderate. As for the seven remaining items, their availability is placed somewhere between little and very little. It appears that our respondents believe that there is not much available information on corporate involvement in most of the listed activities. But this lack of availability may not be inappropriate to the level of importance attached to the items by our university investors. This question is addressed in the next two sections.

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[6] None of the response frequencies totals to 132 in the following tables due to the failure of some respondents to answer all of the questions. There were rarely more than six omitted responses per response category.

Relative Importance of the Social Items

Question 3 asked the respondents to indicate the general degree of importance of each of 15 items of information to their investment decision process or to the implementation of their guidelines by their external investment managers. The importance of each item was based on the assignment by the respondent of an integer from the following five-point scale: 1 = extremely important, 2 = important, 3 = neither important nor unimportant, 4 = unimportant and 5 = extremely unimportant.

Nine of the 15 question items consisted of the social responsibility topics, and the other six were traditional financial items, such as information on the firm's stock option plan. The six selected non-social items of information were included in the question in order to supply some benchmarks for judging the relative importance of the social items. The non-social items of information were drawn from an earlier survey by Buzby [1974], which measured the relative importance of 39 items of information. To select the items we used Johnson's [1967] hierarchical approach to cluster analysis in order to cluster Buzby's results into six homogeneous relative importance groups. We then selected the most important item from the highest relative importance group and the lowest item from the lowest relative importance group. The median item was then selected from each of the four remaining intermediate relative importance groups. Random assignment was used to position the 15 items in the question list. The mean response score for each of the 15 items, their ranks, and the ranks of the social items taken alone appear in Table 2, columns 4, 5, and 6, respectively.

Table 2 shows that, with the exception of item 1 dealing with improper or illegal business or political practices, all of the social items have lower mean response scores than any of the six non-social items. It seems that our respondents find eight of the nine social items of lesser importance to their investment decisions than any of the six non-social items. In spite of the lesser importance of the social items *vis-à-vis* the nonsocial items, it is still possible that some of the social items are used in the university investment decision process. This point is examined in the next question.

Investment Policies

As a measure of university interest in corporate social responsiveness and its impact on their investment decisions, we asked each respondent to indicate his or her university's position with respect to an investment in companies that are negatively involved in this study's nine selected areas of social responsibility, by assigning an appropriate code number to each topic. The code numbers and their explanations are presented below.

Code Numbers	*Explanation*
1	We have a policy which precludes investing in a company which is engaged in this activity.
2	We currently consider the impact of such an activity on our investment decisions on a case by case basis, however, we are also reviewing the need for a formal policy in this area.
3	We currently consider the impact of such an activity on our investment decisions on a case by case basis and we *are not* reviewing the need for a formal policy in this area.
4	We do not currently consider this activity in our investment decision, but we are reviewing the possible need for such a consideration.
5	We do not currently consider this activity in our investment decision and we *are not* reviewing the possible need for such a consideration.

The response frequencies for this question are presented in Table 3 along with relative response percentages (in parentheses). Also, mean response scores for each of the social activities and their relative intraquestion ranks are reported in Table 3 in order to provide a summary indicator of relative interest in the items.[7]

Table 3 reveals that from 56.7 (item 1) to 74.6 (item 9) percent of our respondents selected either policy (code number) 4 or 5 as representative of their positions. Apparently, a majority of our responding universities do not take corporate involvement in the nine social activities into consideration in their investment decisions. Referring back to the preceding section, the low relative importance scores reported in Table 2 are consistent with the apparent lack of usage of the social items in the investment decision process.

It is possible that the availability of information might influence perceptions of relative importance and information usage. That is, our measures of relative importance and usage might be confounded with availability. In order to examine this possibility, we calculated Spearman rank-order correlation coefficients for availability versus relative importance and availability versus investment policies. The resulting correlation coefficients were quite low, relative importance $= -0.200$ and investment policies $= 0.067$, and were not significant at an *alpha* equal to or less than 0.05. These results indicate that there is no statistically discernible association between availability and the other two measures (relative importance and investment policies).

To gain a more complete perspective on the magnitude of the potential lack of investor oriented demand for the nine items, recall that Table 1 showed that 15.0 percent of our responding universities by law could not invest in corporate securities. Also, subject to the potential limitation that some of the universities in category *d* might in fact have some investment funds over which they exercise some control, Table 1 indicated that a maximum of 40.1 percent of the universities could not invest or, if they could invest, they did not appear to provide guidelines to their external managers. Thus, a potential maximum of 55.1 percent of our total sample did not exhibit an investment-oriented demand for social responsibility information. If we add to the 55.1 percent figure the percentage of the remaining sample analyzed in Table 3 who chose either code 4 or 5, we get a minimum demand measure for the total sample. For example, Table 3 represents an analysis of 44.9 percent of the total responses. So, as a percentage of the total responses, 25.4 percent $(.449 \times .567)$ chose either policy 4 or 5. Therefore,

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[7] While the data in Table 3 may appear to be categorical, the response code order (1 to 5) does correspond to a decreasing order of interest in the activities. Therefore, we felt that mean scores were reasonable as a method of summarizing the distributions.

TABLE 3

RESPONSE FREQUENCY DISTRIBUTIONS REGARDING INVESTMENT POLICIES

	Code Numbers						
	1	*2*	*3*	*4*	*5*	*Mean*	*Rank*
1. Involved in improper or illegal business or political practices such as contributions and bribes.	16 (12.6)	6 (4.7)	33 (26.0)	14 (11.0)	58 (45.7)	3.72	1
2. Does not engage in equal opportunity employment practices.	11 (8.7)	10 (7.9)	31 (24.4)	10 (7.9)	65 (51.2)	3.85	2
3. Sale of tobacco or alcoholic beverages.	19 (15.1)	7 (5.6)	20 (15.9)	8 (6.3)	72 (57.1)	3.85	2
4. Sale of products, other than tobacco or alcoholic beverages, which are potentially hazardous to human health and safety (*e.g.*, inadequately tested drugs and highly flammable clothing).	13 (10.2)	7 (5.5)	30 (23.6)	10 (7.9)	67 (52.8)	3.87	4
5. Pollutes the environment (*e.g.*, air, water, noise).	2 (1.6)	6 (4.7)	38 (29.9)	13 (10.2)	68 (53.5)	4.09	5
6. Conducts business activities in countries with limited civil rights.	6 (4.7)	6 (4.7)	30 (23.6)	10 (7.9)	75 (59.1)	4.12^{-}	6
7. Causes other nonpollution-related environmental damage (*e.g.*, destruction of scenic beauty).	2 (1.6)	7 (5.5)	34 (26.8)	14 (11.0)	70 (55.1)	4.13^{-}	7
8. Involved in the sale of military equipment.	9 (7.1)	5 (3.9)	24 (18.9)	6 (4.7)	83 (65.4)	4.17	8
9. Fails to contribute to charitable causes.	2 (1.6)	7 (5.6)	23 (18.3)	12 (9.5)	82 (65.1)	4.13	9

NOTE: A superscripted minus (−) sign for a mean indicates a potential negative bias; i.e., the mean may be understated.

80.5 percent of our total sample could not or did not take item 1 into consideration in their investment decisions.

Since the process described in the preceding paragraph does not alter the order of demand exhibited in Table 3, the complement of item 1's 80.5 percent represents the maximum demand among our nine items (19.5 percent) while the minimum demand is represented by item 9 at 88.6 percent. Thus, depending on the item, 11.4 to 19.5 percent of the responding universities took the social items into consideration in their investment decisions. This represents the maximum demand for the social items of information. From these results, we advance the tentative conclusion that universities as investors may not be a strong source of demand for corporate social responsibility reporting. In support of our tentative conclusion, it should be pointed out that to the extent that some of our response-score means in Tables 2 and 3 are negatively biased, our demand estimates presented above may be somewhat overstated. Also, our tentative conclusion agrees with that of Longstreth and

Rosenbloom [1973] with respect to their limited study of universities.

It should be noted that the preceding tentative conclusion applies only to universities as investors, *i.e.*, to their apparent interest in information as an input to their investment decision process. We did not survey their potential interest, as institutional citizens, in corporate social responsibility reporting. It is possible that as institutional citizens, universities might exhibit a high demand for information relating to corporate social responsiveness.

UNAUDITED VERSUS AUDITED INFORMATION

Our questionnaire also gathered evidence on whether our university respondents preferred audited rather than unaudited information relating to our nine social items. It did not seem unreasonable to suspect that, all else being equal, many respondents would prefer audited to unaudited information. However, all else is not equal, since an audit is not costless. Therefore, we attempted to guard against the possibility that the respondents might ignore the cost of providing audited information by asking them to rate each of the nine social items on the degree of financial sacrifice that they would be willing to make in order to obtain the information. Each item was to be rated on both an unaudited and audited basis by assigning a number from the following scale: 5=none, 4=very little, 3=little, 2=moderate, and 1=substantial. The respondents' mean rating scores and the relative ranks for the means for both unaudited and audited information are presented in Table 2, columns 7 through 10.

The mean scores represent the degree of willingness to incur a financial sacrifice for audited versus unaudited information, as evidenced by the presence or lack of a statistically significant shift in the rating distributions. As seen in Table 2, all of the audited mean-rating scores are lower than their unaudited counterparts. Also, all but two (items 8 and 9) of the nine unaudited/audited rating distribution pairs are significantly different at an *alpha* of 0.05, based on our application of the Mann-Whitney U test to the paired distributions. The seven significantly different rating distributions tend to indicate that to the extent that information is to be presented, some of our respondents prefer audited to unaudited information enough to incur a differential cost to obtain it.

There is a high degree of correspondence between the unaudited and audited relative rankings. The Spearman rank order correlation coefficient between the two sets of ranks is 0.967 and is significant at an *alpha* of 0.01. Thus, it does not appear that an audit would significantly change the relative preference ordering of the items *vis-à-vis* unaudited information. If the preference ordering had changed due to an audit, the results might then have been interpreted by some readers as additional evidence pointing toward the need for an audit for some of the items.

SUMMARY PREFERENCE ORDERING OF THE NINE SOCIAL ITEMS

In a preceding section, we advanced a tentative conclusion that university investors may not represent a strong source of demand for social responsibility reporting. This was a general conclusion in the sense that it was derived from an aggregate impression created by the data. However, we recognize that the decision as to whether one or more of the items should be disclosed, as part of the corporate financial reporting process, is ultimately a policy question. As a policy question, the disclosure decision may

TABLE 4

SUMMARY PREFERENCE ORDER OF THE NINE SOCIAL INFORMATION ITEMS

Information	*Ranks*			*Sum of the Ranks*	*Overall Rank-order*
	Policies (Table 3)	*Importance (Table 2)*	*Audited (Table 2)*		
1. Improper or illegal business or political practices	1	1	1	3	1
2. Equal opportunity employment practices	2	2	2	6	2
3. Sale of tobacco or alcoholic beverages	2	8	6	16	5
4. Sale of products (other than 3 above) potentially hazardous to human health or safety	4	3	3	10	3
5. Pollution of the environment	5	4	4	13	4
6. Business activities in countries with limited civil rights	6	7	5	18	6
7. Nonpollution-related environmental issues	7	6	7	20	7
8. Sale of military equipment	8	5	9	22	8
9. Charitable contributions	9	9	8	26	9

involve factors not comprehended by our empirical study. Hence, this section attempts to provide a potential summary evaluation of our respondents' preference ordering of the nine social information items.

The intraquestion ranks for relative importance, investment policies, and audited information,[8] as presented previously in Tables 2 and 3, each implies a relative preference ordering for the nine social items. Table 4 repeats the three sets of rank-ordered preferences contained in earlier tables.

In examining Table 4, a question arises as to which set of ranks best represents the ordered preferences of our respondents. One of the striking features of Table 4 is that, with the exception of item 3, it does not make much difference on which set of ranks we focus, since the three sets of ranks exhibit a high degree of interquestion consistency.

As statistical support for the visual impression of the high degree of interquestion consistency exhibited in Table 4, we calculated a Kendall coefficient of concordance (W) for the three sets of ranks in Table 4. W measures the degree of association among k sets of rankings and is linearly related to the average Spearman correlation coefficient taken over all groups of ranks. The resulting W was equal to 0.977 and was significant at an *alpha* of less than 0.01. Since the upper limit for W is equal to 1, our high W and its significance confirm a high degree of interquestion consistency in the rankings of the nine items.

As pointed out in Siegel [1956, p. 237], Kendall "suggests that the best estimate of the 'true' rankings of the N objects is provided, when W is significant, by the order of the various sums of ranks." Therefore, we have provided in the last two columns of Table 4 the sum of the ranks for each item and the overall rank-order of the items based on their sums of ranks. Assuming that each of the three sets of rankings is an equally valid measure of interest, the overall rank-order in the last column of Table 4 might represent a reasonable guide to the respondents' order of interest in each of the nine items of social information.[9]

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[8] Since the unaudited and audited ranks are highly correlated, it does not make much difference which set of ranks we chose for the display of implied order of preference. We selected the audited ranks because there appears to be some preference for audited information.

SUMMARY

We mailed a questionnaire to a sample of 500 university chief financial officers and received 292 usable responses. The questionnaire sought evidence relating to university investor interest in, and demand for, information concerning nine areas of corporate social responsibility. Our results indicated that 15 percent of our respondents had their investments restricted by law to certificates of deposits and government securities. Furthermore, as many as 40.1 percent of our respondents could not invest or, if they could invest, they did not appear to provide guidelines to their external managers. Of the 44.9 percent of our respondents who did or were thinking about providing guidelines, a substantial majority did not consider a firm's degree of negative involvement in the nine social activities as variables in their investment decision-making process. Also, the relative importance to their investment decisions of information relating to eight of the nine items was lower than any of the six standard financial items included in the survey. From these results, we advance the tentative conclusion that universities, as investors, may not represent a strong source of demand for many of the topics that might be covered by external corporate social responsibility reporting.

Our results also tended to indicate that our respondents had a preference for audited versus unaudited information. Furthermore, they appear to believe that there is a limited availability of information relating to corporate involvement and performance in many of the nine social activity areas covered by our survey.

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[9] With respect to item 3, we are at somewhat of a loss to explain the large variation between the rank assigned under "Policies" and the ranks for the other two questions. We do know that some church-related universities have for some years maintained a policy against smoking and drinking. Thus, the only information that they would need to make operational a non-selective policy against investment in such firms is readily available. This could account for the high policy rank and the low importance and audit value ranks. Hence, it is possible that the policy rank of 2 overstates, *vis-à-vis* the other item ranks, the interest in this item. If this is true, the overall rank of 5 may be too high.

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The Nature of Income Measurement

William H. Beaver and Joel S. Demski

ABSTRACT: Theory and practice of financial reporting are typically centered on the notion of income *measurement*. In this article, the authors adopt a fundamental measurement perspective. Income measurement is then argued to exist in a world of complete and perfect markets, but not necessarily otherwise. Hence, at a fundamental level the central feature of financial reporting cannot be income measurement. The writers then offer a reinterpretation of income reporting and accrual notions in terms of a "cost-effective" communication procedure.

FINANCIAL reporting is heavily concerned with income "measurement." Theorists have, for decades, argued the nature of income and how best to measure it. Practitioners define their task in terms of income measurement. In turn, the FASB's reaffirmation of the importance of income [FASB, 1976] raises renewed interest in the measurement issue and provides a motivation for our paper.

In particular, the purpose of this paper is to explore the nature of income measurement. We offer initially a strict fundamental measurement perspective in which income measurement is viewed as the representation of a preference ordering on a firm's production plans. Such a measure exists and is open to a straightforward present-value interpretation in the usual economic setting of perfect and complete markets. Unfortunately, these market assumptions render the measure superfluous. Movement to a setting of imperfect or incomplete markets is necessary for economic returns to such measurement to exist, but the desired measurement does not necessarily exist in such a setting.

Abandoning the fundamental measurement perspective, we then offer a reinterpretation of income measurement as a noisy communication process that may be more useful than a strictly cash flow measure and more cost effective than a more ambitious disclosure policy. In this communication setting, however, we do not view the reported datum as a measure in the fundamental sense.

The paper consists of four sections. In the first we review the traditional notion of income measurement in a conventional neoclassical setting under subjective certainty. In the second section we extend the discussion to an uncertain setting where complete and perfect markets are retained. Incomplete markets and the possibility of fundamental in-

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come measurement in such a setting are discussed in the third section. Finally, our reinterpretation of financial reporting as a noisy communication process in the light of potentially impossible fundamental measurement is presented in the fourth section.

INCOME MEASUREMENT IN A CERTAIN WORLD WITH PERFECT AND COMPLETE MARKETS

Consider a conventional economic setting in which non-satiating households supply various factors of production and consume various commodities that are produced by various firms employing the supplied factors. The market structure is complete in the sense that *all* consumption goods as well as all factors of production are traded in organized markets. And each such market is perfect in the sense that prices are known by all agents, no transactions costs of any form are present, all agents behave as strict price takers, and the transaction technology is convex.[1] Moreover, we presume the economy is at an equilibrium, in which supply and demand offers are equated at the prevailing price.

Initially, we focus on an instantaneous setting in which some firm acquires resources and instantaneously transforms these factors into salable consumption goods. Let the m dimensional vector $q=(q_1, \cdots, q_m)$ denote the list of factor quantities acquired by our firm in question. Also let the n dimensional vector $r=(r_1, \cdots, r_n)$ denote the quantities of consumption goods produced. Finally, let P denote the $m+n$ dimensional price vector. We call the receipts less the expenditures of this firm its *income*:

$$I = \sum_{j=m+1}^{m+n} P_j r_j - \sum_{j=1}^{m} P_j q_j \qquad (1)$$

At a fundamental level we would term this an *income measure*. One of the features of the neoclassical setting is that the heterogeneous individual shareholders are unanimous in their rankings of alternative production plans for the various firms in the economy [Radner, 1974b].

This ranking is represented by the income measure in Equation (1). In particular, one production plan is as good as another if and only if it leads to an income measure that is not lower.[2] Each individual is assumed to be nonsatiating, (*i.e.*, each prefers more consumption to less). With perfect and complete markets, an increase in the individual's wealth is commensurate with more consumption. And with the firm's income increased, each shareholder's wealth is increased. Thus, the income measure is well-defined here—receipts less expenditures—and the firms are described as behaving as if they maximized the income measure.

Extension to a multiperiod setting retains the income measure description, but in a more familiar present-value format. We merely recognize production factors and consumption goods in each period and decompose the initial period measure in the obvious manner: that is, a period's income is now defined as the change in the present-value of the future receipts during that period. This provides a series of income measures, one for each period, such that their sum equals the firm's net receipts over the horizon and such that vector maximization of the measures is equivalent to present-value maximization.[3]

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[1] Fractional quantities of all factors and commodities are available.

[2] In more precise terms, we have (with a given set of endowments and prices) a set of production plans that is rank-ordered in a complete and transitive manner. This is then represented by an income measure mapping the production plans into the real numbers and using the $\geq$ relation defined on the real numbers. See Ijiri [1967], Coombs *et al.* [1970], Krantz *et al.* [1971], and Mock [1976].

We conclude this brief summary of income measurement in a conventional neoclassical setting with several additional points. First, the emphasis is on fundamental measurement. We have existence of a mapping from alternative production plans into the real line that (using the $\geq$ relation) represents a complete and transitive ranking of production plans.[4] The measure is by no means unique, but it surely exists and is open to straightforward, conventional interpretation. Second, since plans, possibilities, and market prices are all known, no one would pay an agent to report this measure. Income is already known or is costlessly constructable by each agent. This, of course, follows from the assumptions of certainty and perfect and complete markets.

Third, the distinction between *ex post* and *ex ante* measurement is unimportant. At each intermediate point in time, the market value of the firm's assets (and claims against those assets) is known because complete and perfect markets exist. Moreover, an outcome which results in higher market value and higher net income is preferred. Hence, the net income measure easily and unambiguously performs the role of ranking outcomes as well. Indeed, with subjective certainty assumed, the *ex ante* and *ex post* measures will be identical.

INCOME MEASUREMENT IN AN UNCERTAIN WORLD WITH PERFECT AND COMPLETE MARKETS

Movement to an uncertain world leaves the above argument intact, provided we endow the economy with an appropriately rich set of perfect markets. In such a setting, the precise productive outcome is unknown at the time of production. We model this uncertainty in the usual way, by introducing a state variable, denoted $s \in S$, such that any productive outcome is precisely determined by the productive act chosen and which state of nature obtains [Debreu, 1959, especially Chapter 7].

This provides a basis for trading in factors and consumption goods contingent on which state actually obtains. That is, complete insurance arrangements are possible, through the mechanism of event contingent trading. (Note that we assume all agents eventually learn which state does obtain, otherwise their trade arrangements would be constrained to be equal across state occurrences they are unable to distinguish.)

Return now to our instantaneous production setting in (1). With state indexing, $q^s=(q_1^s, \cdots, q_m^s)$ now denotes the quantities of factors acquired if and only if state s obtains. Similarly, $r^s=(r_1^s, \cdots, r_n^s)$ denotes the quantities of consumption goods produced if and only if state s obtains; and P^s denotes the corresponding price vector. Suppose there are ℓ possible states. Then the firm's production plan is an ℓ dimensional list of input-output combinations:

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[3] An interesting feature of this income measure is that none of the usual income measurement conundrums, such as depreciation in the sense of cost allocation, arise in this setting. To be sure, we may interpret the periodic income measure as consisting of periodic cash flow less depreciation. But it is unnecessary to view the depreciation datum as an allocation of some cost. To see this, consider a situation in which factors acquired in one period produce receipts in several future periods. In a completely rich market setting, any factors carried over from one period to the next are marketable with a known price. In that sense no conventional accrual concepts are involved; nor, for that matter, is any conventional depreciation in the sense of interperiod allocation of a purchase price involved. Moreover, the perfect markets assumption ensures the equivalence among present value, replacement cost, and exit value measures.

[4] Somewhat casually, we say a ranking of elements in a set is complete if all elements in the set are ranked. Similarly, the ranking is transitive when one element is ranked ahead of a second and the second is ranked ahead of a third necessarily implies the first is ranked ahead of the third.

$$((q^1, r^1), \cdots, (q^\ell, r^\ell))$$

and the income of such a firm with such a plan is defined as

$$I = \sum_{s=1}^{\ell} \left(\sum_{j=m+1}^{m+n} P_j^s r_j^s - \sum_{j=1}^{m} P_j^s q_j^s \right) \quad (2)$$

Note in particular that—with the complete and perfect markets assumption—there is a market valuation of each possible production plan. That is, even acknowledging uncertain returns, the presumed rich set of perfect markets allows for an unambiguous (market) valuation of the firm's production plan. And now repeating the prior argument, we again view this valuation as representing the unanimous preference ordering on the set of possible production plans.

Of course, we have merely expanded the notions of factor and commodity in the original setting. Thus, with such a rich set of markets, all that was said before extends with equal force. In particular, the income measure exists in a fundamental sense, and we would not pay anyone to provide it because the component items are already assumed known. In short, existence of uncertainty in and of itself creates no problems with, or interest in, income measurement.

Further note that the *ex ante* and *ex post* measures are now influenced by the state variable. Before the event, the firm's production plan called for production of r^1 if state 1 obtains, r^2 if state 2 obtains, and so on, using some appropriate state contingent factor schedule and resulting in the contemporaneous income measure in Equation (2). After the fact, state $\hat{s}$ has obtained, $r^{\hat{s}}$ was actually produced, and $q^{\hat{s}}$ was actually used. However, under either perspective, the income measure represents a *unanimous* ranking (of production plans in the *ex ante* perspective and outcomes in the *ex post* perspective). Hence, as in the certainty case, the distinction is a trivial one, because both perspectives can be easily reconciled.

It is clear, however, that such a rich set of markets is incongruent with the existent economic structure. We, therefore, turn to the incomplete markets setting, in which all conceivable state contingent trades are *not* available; rather, only a proper subset are.

INCOME MEASUREMENT IN AN UNCERTAIN WORLD WITH INCOMPLETE MARKETS

A setting of imperfect and incomplete markets is important because it is more realistic than the setting discussed above. Concentration on the incomplete setting is, however, sufficient for our purpose. In this setting, the firm is still envisioned as specifying a production plan consisting of state-contingent inputs and outputs. The only difference is that some of the inputs and outputs cannot be traded in organized markets. At one level, the firm may not have markets for certain assets and liabilities, such as outcomes from research and development expenditures, petroleum reserves, rights to accelerated depreciation for tax purposes on its assets, used equipment and the like [Arthur Andersen, 1977]. At another level, the non-existence of futures and insurance markets (except in a limited number of cases) provides *prima facie* evidence of the lack of such completeness.

Without marketability of *all* of the factors and commodities, it is possible to lose the unanimous ranking of alternative production plans. Some shareholders may prefer one plan over another based on nonmarketable commodities. And without trading opportunities, there is no way to resolve, via the implicit compensation mechanism of trade, the differences in taste. That is, in a regime of complete and perfect markets, income maximization is unanimously preferred because it is commensurate with increased consumption. But without access to some markets, irreconcilable conflicts may arise. Shareholders may, for example, display heterogeneous tastes in ranking production plans because of nonmarketable assets which each possesses.[5]

It is, of course, possible to construct settings in which unanimous agreement on production plans does exist in an incomplete market setting. For example, if a proposed production plan is spanned by existing plans (from an existing equilibrium) unanimity will exist and prices can be used to evaluate the proposed plan. Similarly, unanimity exists in the mean-variance world of modern finance. [Ekern and Wilson, 1974; Radner, 1974b.]

But even when unanimity does occur in this setting, it is not necessarily represented by an income measure *in any traditional sense*. Under monopolistic conditions, the firm's owners, for example, may be unanimous in *not* seeking to maximize the firm's market value. And in such a setting representation of the unanimous tastes amounts to representation of subjective tastes. The measure, in other words, becomes entirely subjective; and in this sense it does not enjoy the supposed objectivity of the traditional income measure of resting on observed prices.

The important point, though, is that unanimity in the rankings of production plans is not necessarily present here. In such a case, the firm may simply be unable to select between two alternative production plans. (Game theory solution concepts, for example, often result in exasperatingly rich sets of possible solutions and no basis for distinguishing among them.) Thus, some plans are non-comparable. Indeed the ranking may even be intransitive.

Income measurement, on the other hand, is viewed as a mapping from a set of production plans into the real line (with plans ranked by the magnitude of this income). If such a measure represents a ranking of the alternative production plans, then that ranking must be complete and transitive. The income measure, that is, maps from the entire set of plans and it is surely transitive. Hence, whatever it represents must be complete and transitive. But the ranking of production plans is not necessarily complete and transitive in this setting. Thus, fundamental income measurement, in the sense of representing a unanimous ranking of alternative production plans for the firm, is not necessarily possible here.

Financial reporting cannot, therefore, be described in terms of income measurement in this setting of incomplete markets.

A POSSIBLE REINTERPRETATION

What, then, is the nature of income? One possible answer is available if we more closely examine the nature of the economy with incomplete markets. A particular firm offers a complex set of

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[5] To illustrate, consider a three-commodity world (α, β, and γ) and a firm that must select one of the three production plans listed below (For example, the three commodities could be consumption in three states of the world.):

Net Production	*Plan 1*	*Plan 2*	*Plan 3*
α	45	40	35
β	20	30	34
γ	8	5	10

Three owners equally share in the returns and no market for either commodity exists. Their respective utility functions and evaluations are:

Individual	U_i (α, β, γ)	U_i (45, 20, 8)	U_i (40, 30, 5)	U_i (35, 34, 10)
1	$2\alpha+\beta+\gamma$	118	115	114
2	$\alpha+\beta$	65	70	69
3	γ	8	5	10

Observe that all three disagree on the best plan and that, under majority voting, they will be intransitive.

state-contingent production plans, but many individuals (*e.g.*, investors) do not distinguish among the various states to the extent that the firm's management does. This is a major reason for market incompleteness. Hence, the firm now possesses information that is potentially useful to individuals external to its direct operations.

Such information may be useful in the sense of revising beliefs before decisions (*e.g.*, investment decisions) are made (termed pre-decision information). It may also be useful in terms of providing a basis for contracting, as exemplified by cost-plus payment arrangements, dividend restrictions stated in terms of income, managerial incentive arrangements based on income, and so on (termed post-decision information). Of course, these two roles may occur simultaneously in a multiperiod world [Radner, 1974a].

In transmitting this information, for either or both purposes, a number of options become interesting once we recognize costliness of the communication process. The firm might list its specific $(r^{\hat{s}}, q^{\hat{s}})$ realizations, which would be potentially useful because not everyone (or anyone) is presumed to observe $\hat{s}$. But this is a vast undertaking. Alternatively, it might list its ending cash balance, say $q_1^{\hat{s}}$. An intermediate role is to aggregate the $(r^{\hat{s}}, q^{\hat{s}})$ realizations with the introduction of various groupings and allocations (which can be interpreted as use of pseudo prices for non-marketable factors and commodities). Presumably, this notion of accrual accounting is a cost-effective alternative.

However, the crux of the argument on behalf of accrual accounting rests on the premise that (1) reported income under accrual accounting rules conveys more information than a less ambitious cash-flow-oriented accounting system would,[6] (2) accrual accounting is the most efficient means to convey this additional information, and, as a corollary, (3) the "value" of such additional information system exceeds its "cost."

Income reporting under accrual rules, then, is neither "good" nor "bad" as such. Rather, it may be a desirable middle ground between more and less reporting. But interpreted in this light, it derives its support from the information it conveys (at whatever cost) and *not* from such criteria as "more income is better than less." Indeed, there is no reason to label the bottom line as "income." (Of course, there is no reason not to label it as "income" either.)[7]

This is further discussed below, where we focus more explicitly on the pre- and post-decision settings.

PRE-DECISION INFORMATION

Consider the pre-decision perspective in the AICPA Objectives Study [1973] and the Tentative Conclusions of the FASB's Conceptual Framework Project [1976]. Both studies adopt the view that the primary purpose of financial statements is to provide information to some defined class of users (*e.g.*, investors and creditors in the case of the FASB).[8] At the same time, they also support the usefulness of income reporting as a vehicle for providing the desired information. By implication, they have reached a a judgment regarding the three issues noted above.

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[6] Note that with cash also reported we can meaningfully speak of "more" information in this context.

[7] Though the terminology differs, this is the spirit of Sorter's [1969] "events" approach in which the proper combination of "aggregation" and "valuation" are sought so as to balance information demands and cost. And by extending the argument we may find accrual procedures to be that happy medium.

[8] Although portions of the conceptual framework create ambiguity regarding the extent to which the FASB intends to adopt an informational perspective, recent statements by Sprouse [1977] at an Annual Meeting of the American Accounting Association confirm this informational perspective. In answer to advocates of the "full disclosure" approach to financial reporting, Sprouse responded with a view of income as a cost-effective alternative to a comprehensive disclosure policy.

However, the basis for this judgment is less than clear. As indicated earlier, accounting income rules can be viewed as resulting in aggregations over quantities and prices. If the aggregated number which results is a sufficient statistic, there is no loss of information. In this situation, there is a potential savings in cost of processing, and the income-rule question is resolved on pure efficiency grounds [Feltham, 1977].

In general, of course, there will be a loss of information. In this case, heterogeneity of preferences for income rules may arise because the "value" and "cost" of the information may fall differently across users. A lack of unanimity regarding preferences for income rules obviously characterizes many of our popular controversies. This occurs for the same reasons that we lack unanimity with regard to production plans; indeed, it is a byproduct of the basic argument because information is, strictly speaking, a factor of production.

In a world where markets (for information) were perfect and complete, this heterogeneity could be accommodated by some market-based or elaborate contracting mechanism. Gonedes and Dopuch [1974], among others, have alluded to the possibility that accounting information may induce externalities (and in the limit, a type of public good). In such a situation, some form of collective action may appear, either in the form of private sector self-regulation (*e.g.*, FASB) or a public-sector-mandated system (*e.g.*, Securities and Exchange Commission).

Contextually, however, there is one important distinction between the measurement and information viewpoints that is worth noting. For certain classes of controversies over "most-preferred" income rules, the major alternatives can be reported via an essentially costless disclosure policy. The measurement approach would still attempt to resolve the issue as to which rule results in the "best" measure of income (within limits imposed by nonuniqueness of the measures). However, from an informational perspective, the issue is not a substantive one. While this constitutes a special case from an analytical point of view, empirically many popular accounting controversies fall into this category. Examples include interperiod tax allocation, accounting for the investment credit, and certain aspects of accounting for business combinations.[9] From an informational perspective, substantive issues occur where disclosure or cost is at least implicitly involved. Examples would be replacement cost accounting, foreign currency translation, segment reporting, and "fair value" aspects of business combinations.

In any event, the jump from a desire to supply information to income reporting as a desirable vehicle for such reporting remains unclear. Appeal to fundamental measurement arguments is inadequate. On the other hand, the income orientation may be rationalized with a costly communication perspective. But the studies in question have not professed such a perspective.

POST-DECISION INFORMATION

Essentially the same observations emerge in the post-decision setting of traditional stewardship reporting in which the *ex post* reported income datum is used for contingent contracting purposes. An employment contract based on a target income goal requires *ex post* income reporting, a cost-plus contract requires *ex post* reporting, a current ratio constraint on a lender requires *ex post* balance sheet reporting, and so on. And in each instance, the motivation for reporting rests on the improved allocations which such reporting provides, and not on such criteria as "more income is better than less." From an informational perspective we analyze this setting just as the pre-decision setting was analyzed.

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[9] This implicitly assumes that the format of disclosure does not convey information or otherwise affect the firm's production and financing opportunity set.

Accrual-income measures may again be interpreted as a middle ground between extensive reporting of production plans and results and cash basis reporting that can be rationalized on cost-of-information grounds. In special cases resolution of the "proper" aggregation is straight-forward (*e.g.*, when an aggregate datum is a less costly sufficient statistic for the more useful datum). But in general, we expect heterogeneity of preferences for information systems, which are resolved via non-market determination mechanisms. And our basic point remains: choice of an income rule cannot be resolved by applying fundamental measurement arguments.[10]

SUMMARY

In a regime of incomplete markets, income measurement in a fundamental sense does not describe what accountants do. A condition for fundamental measurement may be missing in cases where we would commit scarce resources to production of accounting numbers. An informational perspective does, however, describe the accountant's activity. But it raises deep concerns over the role of the income concept. Matching of costs and revenues, for example, is not an underlying notion here. Rather, the case for income rests on the assumption of aggregating more informative but also more costly data such that a cost-effective communication mechanism is obtained. However, this assumption is problematical, and in our view, one challenge to accounting theorists is to address the primitive question of the propriety of the accrual concept of income.

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[10] Recent articles have expressed reservations about various deficiencies in income as a fundamental measure and about present value as a valuation mechanism (Ashton [1977], Bromwich [1977], McIntyre [1977], Peasnell [1977], and Scapens [1978]). The expressed concerns arise because of some assumed incompleteness (or imperfection) in the markets. Hopefully, the framework provided here will serve to synthesize these concerns and to provide some "convergence" on this longstanding debate.

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Governmental Accounting in Colonial Massachusetts

William Holmes

ABSTRACT: This paper traces advances in the art of governmental accounting in Massachusetts to approximately 1800. The material studied as a basis for the paper was drawn, for the most part, from original source documents in the Massachusetts Archives, supplemented by readings from Boston town records. The advances noted appear to follow an evolutionary process, culminating in a double-entry appropriation system in use in the colony in the years 1754–1775. Boston appears to have been using a double-entry system by the 1780s. The paper also makes note of a double-entry appropriation system for use by municipalities described in The Town Officer [Freeman, 1791]. The systems encountered appear to be in advance of systems used in Europe during this same period.

ACCOUNTING historians, for the most part, have not been overly impressed with the state of the art as practiced in colonial America. The "Italian Method" is almost entirely lacking in early commercial records, and the widespread single-entry bookkeeping in use, with few exceptions, is rudimentary and full of inaccuracies.

Baxter, in his interesting and thought-provoking article "Accounting in Colonial America" [Baxter, 1956], offered some plausible reasons for this state of affairs that provided a measure of solace to American historians, but colonial accountants were still constrained to seat ourselves "below the salt" at any serious gathering of international accounting historians. However, some recent discoveries by this writer in the Massachusetts State Archives suggest that in accounting related to government, the American colonial accountant more than held his own. The Treasurer of the Colony of Massachusetts was using double-entry budgetary accounting in 1754.

Baxter [1956] pointed out that the colonial merchant did not need double-entry bookkeeping. He had no particular need to determine "profit" at regular intervals; he was accountable in terms of income to no taxing authority; his "net worth" was in terms of acres of land, livestock, bushels of grain, shares in shipping joint ventures, and a variety of claims due from and to other people. Only to a limited extent was any part capable of being turned into quick cash. His single-entry bookkeeping enabled him to keep track of what was not physically at hand, namely his accounts with his debtors and creditors, and, even if rudimentary, it worked well enough subject to an occasional adjustment "to agree his balance with my balance."

It occurred to me that if there is a connection between accountability and the state of the accounting art, the accounting historian in America has been looking under the wrong stones. The accountability factor, missing in the commercial

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arena, was present in the governmental fiscal system—and uniquely so in Massachusetts from the earliest days.

The Massachusetts Bay Company was incorporated in 1629 as a business enterprise—a joint stock company accountable to its English stockholders. Its Court of Assistants (Board of Directors) managed the company and reported quarterly to the "Generalitie" of stockholders in "General Court." The accounts were "audited" by duly appointed "auditors" in London before the first planters sailed for New England. The form was similar to that underlying the other English colonizing ventures of the times—The Viriginia Company, the Plymouth Company, *etc.*—but The Massachusetts Bay Company was unique in one respect. The "Management" and Charter were effectively moved to Massachusetts almost immediately, and over the years 1630–1640, as the old commercial venture took on the attributes of a self-sustaining civilian entity, much of the old business relationship between the Generalitie and the Court of Assistants carried over to the structure of the Civil government. In 1645, to help strengthen the fiscal relationship between the "Management" and the evolving towns, which through taxation were providing the bulk of the revenues, the General Court approved the creation of the post of Auditor General and wrote a lengthy job-description to fit the post. Each town sent its deputies to the General Court and through these representatives, was entitled to an on-the-spot accounting each year.

The actual books of account for the province prior to 1753 are missing, but the Massachusetts State Archives have the reports of the treasurers back to the 1650s. I propose to examine the advances made in the provincial accounts during the hundred years prior to the revolution by looking at the Treasurer's Report for 1675–1679, the accounts rendered in the 1740s, and the actual accounting records for the year 1754. I will also consider the accounts for the town of Boston in the 1790s.

THE TREASURER'S REPORT 1675/1679

The Treasurer prepared a single report covering the years 1675 to 1679, from the commencement of King Philip's War to about 18 months beyond the official close of the war on February 12, 1678 [Mass. Archives]. The additional time probably allowed for submission of all charges and collection of the various "Rates" against the towns for revenues to pay the bills.

The Report consists of four double-folio pages, the left folio showing "debits" representing expenditures, and the right "folio" showing "credits," representing income. The usual "To" and "By" prefixes are used to round out the double-entry format. Each of the 73 classified line items comprising the expenditures is cross-referenced to what is almost certainly a supporting ledger page, and the amount brought into the Report for each line item appears to be the total of the detail set forth on the ledger pages. Figures 1 and 2 of the Appendix show the debit and credit sides of the first double-folio page. Note also that the line items in the Report do not follow the sequence of the ledger pages. Like items were grouped together into ten major expenditure classifications and subtotals derived for each of these classes. Revenues were similarly classified into logical groupings.

The stark realities of the Indian War come down to us in one laconic entry, an "accop^t curr^t" (account current) included in "payments to persons"

> "To Scalps, that accop^t curr^t for allowances to severall for slaying sculking Indians £21.2

FIGURE 1

Condensed Report 1675/1679

To payments to persons	£34,672. 9.11	By assessments	£30,914.17.10
To disburst for provant (food)	2,723.10. 5	By former Treasurer	8,466. 8. 7
To disburst for clothing	1,762. 6. 6	By captives-proceeds of sale	339.18. 0
To disburst for magazine (guns, etc.)	1,038.15. 3	By fines	340. 8. 6
To disburst for the traine (supplies)	428.16. 2	By customs, net	3,766. 8. 2
		By apparel, sold	550. 8. 8
Total charge of the warr, as afore	40,625.18. 3	By sundry sales	314. 0. 5
To disbursements relating to Civill Goverment	8,917.13. 8	By sundries	630.12. 0
		By amount due by County of York	305.13. 2
To disbursment relating both to the warr and Civill Goverment as afore	2,304. 6. 7	By military re-imbursements	1,000. 0. 0
To fodder	91. 0. 0	By mint coinage	80. 0. 0
To several towns (abatements)	472. 2. 4	By several towns	3,869.12. 8
To remaining accounts receivable for which Treasurer is to be accountable	127.18. 5	By miscellaneous (seven items)	127.10. 4
		By balance due to Tr:asurer	1,773. 0.11
	£52,538.19. 3		£52,538.19. 3

Indian captives were sold into slavery in the West Indies, which explains the revenue item

"By captives—proceeds of sale £399.18.0

Figure 1 is a condensed version which has been prepared to show the overall format. Individual line items of expenditures have been omitted but the subtotal for each related grouping is shown. Seven small classifications of revenues have been combined as "Miscellaneous."

There are several features of the Report that are worth noting:

1. It is not a cash receipts and disbursements account. Total assessments (£30,914.17.10) are accrued and, to the extent not collected, subsequently abated (£472.2.4). The last debit entry charges the Treasurer with amounts still to be collected.
2. The income items are credits, and the expenditures debits, compatible with postings to "fictitious" accounts in a double-entry system.
3. The expenditures in the Report involve 73 classified line items, each referenced to a ledger page. The classification is not carried to extremes as evidenced by the following item:

> To Miscellaneous that accp^{t} curr^{t} for severalls ax mixed and rated together as not well to be placed to distinct accp^{ts} £54.2.0

I have written confidently of "ledgers," although I do not assert these were necessarily part of a double-entry system. The confidence is based on the wording of the extremely interesting Audit Certificate written on the last pages which reads:

> In Obedience to an order of y^{e} Honored Gen^{l} Court, Dated May 19th, 1680 wee ye Subscribers mett at ye time Appointed to peruse ye Country Treasurers Accompts, & accordingly proceeded soo farr as we thought nessesary unless long time given for Examining of it in ye particulars, ye Acco^{t} being very Voluminous Comprised in ffower large Leagers. But soo farr as wee Examined, and Upon consideracon of ye whole wee judge ye Acco^{t} to be just, & Cap^{t} Hull & Cap^{t} Honibsman making Oath thereto may be allowed by this honoured Court, the Ballance due to ye Treasur^{r} per said Acco^{t} is Seaventeen hundred Seventy three-pounds, elevenpence money.

> The said Treasur^r informs v^t Severall Townes are in Arreares for their rates, though Creditt be given for y^e whole, as also there is one hundred twenty six pounds eighteen shillings four pence due to y^e Country for ffines captives, etc. We finde Cap^t Hull hath charg^d ffity two pounds per Annum for ffour years as Capt^t Honibsmans Salary for keeping ye books, but nothing for himself & servants.
>
> All w^{ch} wee present to this Honered Court seated in Boston. October ye 21, 1680
> Humphry Davie
> John Richards II
> James Russell
> Anthony Stoddard"

So there were indeed "ffower large Leagers." The following analysis of the cross references to ledger pages appearing in the Report also tells a story:

Ledger Page Reference Range	*Numbers of References*
200 to 300	2
301 to 400	3
401 to 500	5
501 to 600	36
601 to 700	49
	95

A reasonable guess would be that the small numbers of references in the ranges 200 to 500 indicate the bookkeeper was using up some remaining empty pages in old ledgers brought forward from prior years.

It will be noticed that the auditors audited only "soo farr as we thought necessary." The "certificate" as written was presented first to the House of Magistrates—the upper house of the Legislature—and they appended their approval as follows:

> This return of the Treasurer is Accepted by the magistry, their brethern the Deputies have to Consent
> Edw^d Rawson Secretary
> 25th October 1680

The Deputies—the lower house—were not, however, satisfied with the offhand way the auditors had gone about their job and annotated their disapproval:

> The Deputies Consent not hereto
> William Torrey, Clerk

On the Contra page appears the following:

> But the Deputies do consent provided such account as per overhead given be verified and do therefore apoynt Capt. Hutchinson, Capt. Tho. Brattle, Capt. Johnson further to improve that matter and what they find bring to the above attention
> Jo Cooke per order 2.9.80

All apparently went well with the "verification" and the final entry reads:

> passed by the Deputies
> 2 November 1680
> Consented to by the magistry Edw^d Rawson Secretary

All of the original auditors and subsequent appointees were prominent Bostonians and active in the civil and mercantile life of the Town.

The Treasurer's Report in the 1740s

The Treasurer's Reports in the 1740s are in the traditional form of an account of charge and discharge, quite unlike the "Income and Expenditure" format described above for the years 1675 through 1679. However, the content does not differ materially. Full assessments for tax revenues from the towns continue to be accrued and expenditures are classified under logical headings. However, there is one important difference. Each subtotal for the expenditures is related to an Appropriation authorized by the General Court. Those for the year 1647–48 are as follows:

	Total expended
Appropriation for Defense	£42,863. 2. 0
Appropriation for Forts and Garrisons	16,917. 5. 5
Appropriation for Grants	12,352.14. 5
Appropriation for Repress^s (Representatives) Pay	4,418. 5. 0

No Establishment	3,172. 4.10
Appropriation for Contingencies	294. 19. 6
Appropriation for Louisburg (the Expedition)	4,736. 4. 3
Sum total of Appropriations	£84,754.15.5

THE TREASURER'S BOOKS OF ACCOUNT—1754

We have seen the Massachusetts' Treasurer in the period 1675–1679 enter the detail of his accounts in "Ffower large Leagers," including accounts for taxes collectable from the towns. We have seen him prepare his Report in the style of an "Income and Expenditure Statement" and classify the totals of the expenditure ledger accounts into homogeneous groups. He allowed for abatement of town taxes and amounts still to be collected. This Report, however, made no mention of comparisons with governmental appropriations.

In the 1740s, the Treasurer's Report changed from an income and expenditure format to a classical account of charge and discharge presentation with the important addition of relating expenditures to underlying authorized appropriations.

From 1754, we have the underlying books available to us, and we find a major advance in the state of the accounting art. The accounts are kept according to the "Italian Method"—double entry, ledger and journal. However, the fascinating feature of the system goes beyond that. The system integrates into the ledger the related accounting for appropriations. Professor Basil Yamey of the London School of Economics, with whom I corresponded, has tentatively confirmed that this combination of double-entry accounting with the underlying budgetary accounts was probably not used anywhere in Europe by any governmental unit at this time. Two excellent books are available relating to the fiscal systems used by the British Government during this period: *The Treasury 1660–1870* [Roseveare, 1973] and *British Public Finance and Administration 1774–92*. [Binney, 1958]. Some excerpts from Binney's book seem appropriate:

> In the methods employed [in Britain] in account and audit, side by side with the modern and administrative, the medieval and judicial was still found strongly entrenched . . . some [revenue departments], probably all, employed the double-entry system of bookkeeping. . . . The great spending departments of defence were independent of Treasury control, and they went their own ways until in the nineteenth century a uniform system of double-entry was imposed upon them. [Binney, 1958, p. 4.]

> [Thomas Irving] was satisfied that in Holland the authorities never had a complete view and knowledge of all the revenues they managed. [Binney, 1958, p. 255.]

> "Though Thomas Sully is credited with having considered the adoption of a double-entry system (in France), he did not effect this." [Binney, 1958, p. 256.]

The system used in Massachusetts was extremely simple and may be exemplified as follows:

Chart of Accounts

Treasury Account
Gold and Silver Account
Government Securities
Province Bills
Appropriations #1
#2
#3
#4
#5
etc.
Accounts Receivable,
Towns A
B
C
D
E
F
etc.

The Legislature met prior to the beginning of each fiscal year to consider budget estimates for various categories of expenditure in the ensuing year. The categories would include such items as civil governments, forts and garrisons, grants, and contingencies. When the amounts to be appropriated for each category were determined and formally approved, the Treasurer was officially notified and made the following journal entry and the related postings to the ledger accounts.

Treasury Account	Dr	xxxxx	
Appropriation #1			xxxxx
#2			xxxxx
#3			xxxxx
#4			xxxxx
#5			xxxxx

The Legislature then made its estimates of normal recurring income from such items as customs duties, court fines, *etc.* The balance necessary to cover the appropriations was assessable against the various towns in the province by means of "rates" against each town. When the amount to be assessed against each town was approved the Treasurer was again officially notified and made the following Journal Entry and related ledger postings:

Assessment against Town A	Dr	xxxxx	
Town B		xxxxx	
Town C		xxxxx	
Town D		xxxxx	
Town E		xxxxx	
Treasury Account			xxxxx

As the money was collected from the various town Treasurers, the Treasurer recorded the amounts as follows:

Gold and Silver Account	Dr	xxxxx	
Town A			xxxxx
Town B			xxxxx
Town C			xxxxx
Town D			xxxxx
Town E			xxxxx
etc.			

As the money was spent against warrants approved by the Legislature the Treasurer made note of the expenditures as follows:

Appropriation #1	Dr	xxxxx	
#2		xxxxx	
#3		xxxxx	
#4		xxxxx	
#5		xxxxx	
Gold and Silver Account			xxxxx

The Treasurer had no authority to expend money except against an authorized Appropriation. If the need arose to authorize a transfer of budgeted funds from one Appropriation to another, this could be done only on the authority of the Legislature, who would formally notify the Treasurer. He would then record the transfer.

Appropriation #1	Dr	xxxxx	
Appropriation #2			xxxxx

The Province at times had resort to borrowing and the receipts and repayment of the underlying notes were duly journalized. Individual towns would on occasion provide services for the Province and be given credit against their assessed taxes. Finally, towns that encountered hardships would sometimes be granted abatement of part of their assessments by special approval of the Legislature. The Treasurer, after official notification, would journalize and record the facts.

The ledgers and journal were entered in ink, the caligraphy is handsome, hardly one correction was noticed in an entire year, and the cross-referencing between the journal and ledger is meticulously carried out.

An interesting feature is that balances remaining on appropriation accounts were not closed out to the treasury account at the end of each year but were allowed to carry forward into the next year. Another interesting feature is that the balance in each individual town account, representing uncollected taxes, was periodically aged on the ledger page by year of assessment. To facilitate this process receipts from collectors were "aged"as posted. It may also be noted that the system used for revenues is still used by Massachusetts municipalities and referred to as the "modified accrual method." Under this method the major tax assessments eventually paid by the townspeople were accrued and most of the "indirect" taxes—customs duties, fines, *etc.*—were kept on a cash basis. The only major step missing in the colonial accounts present in today's system was that "encumbrances" against appropriations were not recognized at year-end.

Despite what appears to be a complete double-entry system the financial report rendered annually to the Legislature continued to be in account of charge and discharge format. The information to construct this report could, of course, be derived with relative ease from the ledger accounts. Also the records so far have not disclosed a trial balance book, although trial balances might have been prepared annually on separate sheets of paper.

The Treasurer in 1753 was Harrison Gray, who had just been appointed to the office and held the post until 1775. A summary review of the ledger and journals during this period seems to indicate that the system described above was in force during this entire period. However, Gray was a Loyalist, and with the defeat of the British forces in the revolution, he moved his family from Massachusetts to England.

Some intriguing questions remain. Did Gray inherit the system from earlier Treasurers whose ledgers and journals are not available to us? If so, who invented the system and how far back does it go? If the system was introduced during Gray's period of office, did he himself keep the books or did some unnamed knowledgeable clerk do the actual record keeping?

Harrison Gray himself was a well-established merchant, having taken over a successful ropework business. My guess (and it is only that) is that Gray introduced the system. After he left for England in 1775, a new Treasurer appointed by the revolutionary government took over the office. If Gray himself was the brains behind the accounting system, it is unlikely that his successor would be equally knowledgeable. It will be interesting to examine the records beyond 1775 to see whether the new Treasurer was able to sustain the accounting standards set by Gray.

TOWN ACCOUNTS

This article has dealt thus far with the accounts of the Province of Massachusetts. However, at a lower level of government, an equally interesting matter warrants attention. In 1791 Samuel Freeman, a lawyer resident in Portland, Maine, published the first edition of his book *The Town Officer* [Freeman, 1791] dealing with the duties of the Selectmen, Town Clerks, Town Treasurers, Assessors, *etc.* However, one of the late chapters sets forth in 27 pages "A Plain and Regular Method to Keep Accounts of the Expenditures of Monies voted by a Town; upon an Inspection of which, the State of its Finances may at any time be known." The system described is double-entry and, like the Massachusetts system, includes the accounting for the annual appropriations as an integral part of the system. The chapter provides a full "set" of accounts, journal and ledger, based on normal transactions within a town during the year.

It should be noted that Freeman's book is dated five years before *A New and Complete System of Bookkeeping*, published in Philadelphia in 1796 [Mitchell, 1796]. The obvious question is how a lawyer would have been knowledgeable enough to devise such a system. Freeman's second edition was published in Boston in 1793 and he undoubtedly had connections in Massachusetts. Was he familiar with the Massachusetts system of accounts and did he adapt it to town finances? There is a further possibility. The third book on bookkeeping published in America was Thomas Turner's *An Epitome of Bookkeeping by Double Entry*, also published, in 1804, in Portland, Maine [Turner, 1804]. Could there have been some arrangement between Freeman and Turner for the accounting chapters in Freeman's book?

BOSTON TOWN ACCOUNTING IN THE 1790S

The move towards public accountability is noted also in the minutes of the Boston Town Meetings in 1798 and 1799. In 1798 the "Committee Appointed to Audit the Town Treasurer Account" after reporting that they found the last year's accounts "well Vouched and right cast" reported also that "They annex Gen[1] Account of the Treasurer and a tryall Balance of his Books." More significantly, however, they go on:

> Your Committee recommend that the Town desire the Selectmen to procure a Book and order the Town Clerk to keep Accounts agreeable to the Appropriations as above and in their Drafts on the Treasurer it will be proper to designate the Appropriation; they also Recommend that the Treasurer be ordered to Open as many Accounts in his Books as will conform to said Appropriations & charge each agreeable to the Selectmen's Drafts—so that in future the Town may know which & how much they fall short of the Sums granted.

This was basically the system recommended in *The Town Officer*. The Boston Treasurer was apparently already using double-entry. Now he was being asked to integrate the appropriation breakdown into his ledger classifications. The detail in his ledger should agree with that in the Selectmen's "Book."

The town went one step farther the following year at the May 14, 1799, town meeting.

> "A schedule of the Town expences was reported and on motion, Voted that the same be printed & delivered to the Inhabitants."

The Account was duly printed and distributed in considerable detail. A summary of the amounts expended by subtotals corresponding to the amounts appropriated at the beginning of the year is as follows:

	Appropriation	*Expended*
School Masters & Ushers, repairing schools and wood	$11,000	10,206
Watchmen, Coals, Candles, etc.	3,000	2,672
Assessors Pay etc.	2,700	3,066
Lamps Oil lights etc.	4,000	3,843
Salaries to Town Clerk, Treasurer, Messengers, etc.	1,632	1,696
Constables	150	170
Clerks of the Market	33	33
Repairing clocks, Engines, Pumps, etc.	800	724
Printing	319	325
Ringing bells	300	321
Paving and repairing streets	7,000	7,569
Support of the Poor	16,000	14,820
Incidental charges	1,000	875
Total	$47,934	46,320

Although a few of the individual categories vary somewhat from the amounts appropriated the total spent is very close to the total appropriated. The Selectmen undoubtedly had the right when approving "drafts" on the Treasurer to transfer between appropriations.

CONCLUSION

Much remains to be done to resolve all the questions posed above. The most immediate step, as I have pointed out, is to analyze the Massachusetts records beyond 1775. The second is to check the systems in use in adjoining New England colonies at the same period. The records of the other original colonies—Virginia, the Carolinas, New York, and Pennsylvania—should also be examined.

At the municipal level, the Boston records should be researched. These are now in the custody of the rare book room at the Copley Square branch of the Boston Public Library. However, they have not yet been indexed or catalogued and currently are not being made available for research. I was able to make a cursory examination of one journal and ledger and it is apparent the town was using a double-entry system about 1780, perhaps earlier.

All in all, early governmental accounting appears to be a fertile field for the American colonial accounting historian to cultivate. We must

> Copy fair what time hath blurred
> Reedeem truth from his jaws.
> (Herbert 1800)

APPENDIX

FIGURE 2
MASSACHUSETTS COLONY
Treasurer's Report—1675/1679

1675	662	Massachusetts Goverment Dr	Cash	Cash
June	643	To Military Service, that accp^{t} curr^{t} for Stipends to Comanders, Officers, and Souldiers	£ 16,270.19:10–3/4	
	646	To portage, that accp^{t} curr^{t} for posts, Guids, scouts, pilots, and Interpretors	£ 81.19 2–3/4	
	549	To Gards, that accp^{t} curr^{t} for Convoughs, Cart^{s} Ligherter^{s}, porter^{s}	£ 196. 2 9–3/4	
	630	To Maritim Disbursments that accp^{t} Curr^{t} for wages to Seamen and frait	£ 578.18.3	
	657	To wounded men, that accp^{t} curr^{t} for pay^{m}ents to Doc^{rs}, Chirurgeons, Maimed souldiers, and accommodations	£ 568.14.8–2/4	
	656	To Contingencies that accpt currant for Journies, allowances, gratuities, serches &	£ 668.14.–3/4	
	623	To Indian service that accp^{t}curr^{t} for payments to the Native souldiers	£ 566.8.6–2/4	
	637	To Mixt Disbursments that accp^{t} curr^{t} for charges brought in by the severall Townes for Hors, Armes Ammunition, provant & of which that certified to be pd by the Former Treasurer, that accp^{t} curr^{t} hath Credit for as p Contra	£ 14,830.10.3–1/4	
	626	To Ferriage that accp^{t} curr^{r} for Transporting over passes	£ 34.11.7	
	658	To Accountable payments that accp^{t} curr^{t} for money rec^{d}. by severall persons to pay Souldiers on which rests on accp^{t} on returns	£ 79.2.1	
	556	To Scalps that accp^{t} curr^{t} for allowances to severall for slaying skulking Indians	£ 21.2.–	
	540	To Eastern Expedition that accp^{t} curr^{t} for severalls sent to these parts for supply of the Army and Inhabytants there	£ 303.13.9 2/4	
	544	To Discountments that accp^{t} curr^{t} for the Debits of plymouth Colony, Conecticott Colony and United		

FIGURE 2.—*Continued*

		Colonies their severall accpts curr. for ballancing Dito accp^{ts} on the giving us bond for £1000——as p. agreement of the Commissioners	£	306.–.6	
	661	To Massachusetts Colony that accp^t curr^t for our portion of the Debit of the United Colonies that accp^t curr^t being £ 163.3—expended on the joint accp^t	£	85.12.3	
		payments to persons as afore	£		34,672.9.11 3/4
June	568	To Biskett that accp^t currant for Dito, bread rusk	£	1,224.10.–3/4	
	552	To Flesh, that accp^t curr^t. for Befe, pork, and bacon	£	488.3.3–2/4	
	607	To Chanlery that accp^t curr^t for Chese, meate, salt fish, oyle, lard, oatmeal, vinegar, tallow, & wick	£	33.2.10	
	544	To Graine that accp^t curr^t for wheat, rye, barly pease, oates, Indian, bought and dd for the souldery	£	113.19.9–2/4	
	569	To Cattell that accp^t curr^t for Oxen, cowes, heifers sheep, hoggs &	£	225.5.10–2/4	
	283	To Ligors that accp^t curr^t for wines, spiritts, beer cider and mollasses	£	243.1.9–2/4	
	544	To Grocery that accp^t curr^t for Fruit, spice, sugar sucketts, tobacco, & pipes	£	176.19.–	
	648	To Billeting that accp^t curr^t for Ourtering and entertainments	£	218.7.9–2/4	
		Disburs^t for provant as afore			2,723.10.5–1/4
		Transported to f° 2			£37,396.–.4–3/4

FIGURE 3

MASSACHUSETTS COLONY
Treasurer's Report—1675/1679

1676 May	662	Contra Cr	Rate	Cash
	662	By assessments that accp^t curr^t for 10 Rates in specie, bating 1/4 pt paying silver	14050.11.8	10537.18.9
		By Dito for 6 Rates	7039.18.–	5279–18–6
1677 June		By Dito for 6 Rates bating 1/3 pt	7039.18–	4693.5–4
Nov^b		By Dito for 1 (of 3 Rates) in specie bating 1/3 pt	1143.15–11–2/4	762.10.7–2/4
1678		Dito the other 2 Rates in silver	—	2287.11.11
Nov^b		By Dito for 2 (of three) Rates in specie bating 1/2	2329.6.2–2/4	1164.13.1–1/4
		Dito (the other) 1 Rate in silver	—	1164.13.1–1/4
1679 June & Nov		By Dito assessments for 4 Rates in specie bating 1/2	4837.14.5	2410.17.2–2/4
		By Dito for 1 Rate (of 1-1/2) in specie bating 1/3	1151.8.–2/4	767.12.–1/4
		Dito the other 1/2 Rate in silver	—	575.14.–1/4
		By Dito assessments for 30 single Country Rates upon the County of York to equal them with other Townes viz: 26 in specie bating 1/4 paying silver 7 dito bating 1/3 2 dito bating 1/2		
		35 Rates (as fore ord N° 11345)	1567.2.6	1127.16.9
		3 Dito in silver	—	134.6.6
			39,159.14.9–2/4	30,914.17.10–1/4

FIGURE 3—*Continued*

618	By Former Treasurer Richard Russell Esqr that acc^t curr^t for sundry payments made by him & in and as silver; together with some Town Disbursements and Rates in species, redused to silver	8,466.8.7–1/4
633	By Seizures that accp^t curr^t for a ꝑcell of Racoone skinns forfited	4.8.4
323	By Boards that accp^t curr^t for a ꝑcell accoumpled for by Major Clark	20.2.6
625	By Lead that acc^t curr^t for a ꝑcell resting with John Rootes & in Springfield Town	14.6
555	By Hides that acc^t curr^t for severall brought in to the Treasury by the Commissioners, all not pd. for	40.4.6–2/4
550	By Captives that accp^t curr^t for divers prisoners of warr sold by the Commissaries for which some Debts are still standing out	399.18.–
557	By Fines, Military, Civill and perquisites of Court that accp^t curr^t for the rest thereof of which severall are unpd	340.8.6–2/4
550	By Customes that accp^t curr^t for the neat produce thereof, the charge of Collecting being deducted	3766.8.2
656	By Apparrel that accp^t curr^t for severalls recd by the Soldiers of the Commissaries and defalked out of their Debentures	550.8.8
	Transported to folio 2	£44,517.11.2–2/4

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The Effects of LIFO Inventory Costing on Resource Allocation: A Public Policy Perspective

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ABSTRACT: The use of the LIFO inventory method is advantageous to taxpayers in periods of rising inventory prices since it can reduce the amount of taxes which must be paid on inventory profits. This tax reduction can be accomplished most successfully if the taxpayer does not permit the level of ending inventories for a year to be any less than that level was at the beginning of the year. In this paper, the year-end inventory maintenance activity by firms who use LIFO is analyzed in the context of economic efficiency. The methodology employed is the construction of an analytical model for after-tax economic profit maximization by a firm which uses LIFO, an analysis of the profit maximizing conditions from a Pareto-optimal perspective, and the conclusion that year-end inventory maintenance is an inefficient use of resources. The paper concludes by suggesting a replacement cost solution to the problem of accounting for inventories as a more efficient alternative to LIFO.

Within the last few years, several companies have changed their method of accounting for inventories for federal income tax purposes from the first-in, first-out (FIFO) method to the last-in, first-out (LIFO) method. These companies have made the change notwithstanding the fact that Section 472(c) of the Internal Revenue Code requires taxpayers who use LIFO for tax purposes to use it for financial reporting purposes as well. Evidently, the companies who have changed to LIFO during this recent inflationary period have not viewed the provisions of Section 472(c) as having a detrimental effect on their share prices, or on their ability to borrow capital, even though Section 472(c) causes a reduction in reported income. They have viewed the change to LIFO as an opportunity to increase their wealth through the present value of savings in taxes paid, and, in fact, recent studies suggest that the stock prices of firms increase as a response to a firm's change to LIFO [Sunder, 1973; Ball, 1972]. However, studies which have examined whether a change to LIFO has an effect on individual investor, or manager decisions, have had differing results [Jensen, 1966; Dyckman, 1964].

Undoubtedly, when inventory prices are rising, the use of LIFO as opposed to FIFO can result in a reduction of a firm's tax liability. The amount of the reduc-

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tion, if any, however, depends upon the extent to which the firm prevents older and presumably lower-cost layers from entering cost of goods sold. Under LIFO, the entrance of old-cost layers into cost of goods sold can be prevented if the firm's purchases of inventory during the year are at least as great as its sales, or its inventory level at the end of the year is at least as great as it was at the beginning of the year.

The importance of having a LIFO firm control its year-end inventory levels is certainly not new [Butters, 1949] and has been well publicized in the professional literature [Levy, 1974]. In fact, several of the Big Eight accounting firms have recently published pamphlets for the benefit of their clients who changed to LIFO in the early 1970s which explain the inadvisability of liquidating year-end inventories (*e.g.*, Haskins & Sells, 1974; Arthur Andersen & Co., 1974; and Ernst & Ernst, 1975).

THE PURPOSE OF THIS STUDY

The purpose of this study is to determine the effect which the control of year-end inventory levels by LIFO firms has on the allocation of an economy's productive resources and on an evaluation of that effect from a tax policy perspective. It seems reasonable to assume that, in the absence of income taxation, no firm would be concerned with the level of its year-ending inventory, but would follow some kind of inventory purchasing policy which minimizes the costs of ordering and holding inventories, and which reduces the effects of inflation. Accordingly, the necessity of having a certain amount of inventory on hand at a particular point in time may be viewed as a departure from what optimal firm behavior would have been in a tax-free economy, in response to the introduction of an income tax structure which allows the use of LIFO.

Such tax-induced departures from optimal economic behavior in a tax-free economy are interesting from a tax policy viewpoint because they affect the allocation of economic resources. Unintended reallocations of resources caused by the tax structure should be avoided since they interfere with the ability of the market system to allocate resources efficiently, thereby reducing economic welfare [Musgrave, 1959]. The effects of taxation on the efficiency of resource allocation has been studied in the context of different taxes and economic decisions including the effects of the individual income tax on the labor-leisure choice [Harberger, 1974]; the effects of the corporation income tax on capital formation in the corporate sector [Harberger, 1974]; the effects of the preferential capital gains tax on choice of investment opportunities [Tobin, 1958; Feldstein, 1969; Stiglitz, 1969], and the effects of the investment tax credit and accelerated depreciation on the decision to replace fixed assets [Taubman and Rasche, 1971]. All of these studies found that taxation affected the economic decisions made, and, hence, interfered with the efficiency of resource allocation.

A second objective of tax policy—equity—states that people with equal ability should be taxed equally (horizontal equity), and those with unequal ability should be taxed unequally (vertical equity). A reading of the legislative history of the 1939 Code reveals that LIFO was introduced into the Internal Revenue Code in 1939 for equity reasons as a means of protecting industries with no future markets for their raw materials from being taxed on inflationary inventory profits. However, the legislative history makes no mention of efficiency considerations concerning LIFO.

Frequently, objectives of equity and efficiency cannot be satisfied simultaneously with respect to a particular piece of tax legislation. However, given a particular equity objective such as protecting purchasers of inventory against inflation, there may exist alternatives to LIFO, such as an inflation-adjusted system of accounting for inventories, which accomplish the same equity objective but which may be more efficient than LIFO. Accordingly, it is the responsibility of the policy maker to assess the efficiency of the various alternative ways of accomplishing an equity objective so that the most efficient one may be chosen.

DOLLAR VALUE LIFO AND YEAR-ENDING INVENTORIES

So far, the discussion of the control year-end inventory levels has suggested that firms using LIFO must control the level of their physical inventories, in order to maximize their LIFO advantage. This is not the case in reality. Reg. §1.472-8 permits the use of dollar-value LIFO by any taxpayer who so elects. By electing dollar-value LIFO, a firm, in essence, is able to treat all of the inventory items in a "natural business unit" as one item of inventory. The inventory items grouped together into a natural business unit are called a "pool" of inventory items.

The advantage of dollar-value LIFO to taxpayers is that year-end inventory liquidations are deemed to occur only when the total base period dollar investment in the pool decreases. Therefore, to avoid year-end inventory liquidations, a firm must be sure that its total dollar investment in the pool when deflated back to base-period dollars is at least as large as the same investment at the beginning of the year. However, the levels of the actual items in the pool may decrease, and new items may be added to the pool without causing an inventory liquidation. Note that, in this context, the term "base period" refers to the period in which the firm first adapted LIFO plus any periods in which there occurred additions to year-end inventory levels.

Dollar-value LIFO, therefore, gives a firm some flexibility in maintaining year-end inventory levels. However, the problem is by no means avoided, for the firm is still required to have a certain investment in inventory at a particular point in time if it is to take full advantage of the LIFO provisions.

LIFO AND TAX EFFICIENCY: THE MODEL

The purpose of this section is to examine the effects upon resource allocation caused by management of year-ending inventory levels whether the levels managed are physical units or base period dollars of investment in inventories. The examination will be made through the use of an analytical model.

Assumptions

The model assumes that a firm is operating in the following economic environment:

1. The prices of the raw materials inventories used by the firm are rising, although not necessarily at a constant rate.
2. The firm purchases m factors of production other than inventory in a perfectly competitive factor market.
3. The firm produces n products which it sells in a perfectly competitive product market.
4. The raw materials may not be substituted for any other factor of production, nor can any other factor of production be substituted for inventory. Accordingly, each finished good produced requires a fixed amount of raw materials re-

gardless of the combination of the other factors selected.

5. All finished goods produced in a year are sold in the same year. In addition, the production time is short enough to enable the firm to maintain no year-end work-in-process inventory. The fact that the firm maintains no year-end finished goods, or work-in-process inventories facilitates the development of the model and the analytics. It does not, however, cause differences in results from those which would be obtained if the assumptions were not made. A similar argument may be made for assumption 4 above. Note that assumptions 4 and 5 may be dropped in the case of a retailer.
6. The firm uses the LIFO method of costing inventory.
7. The firm's production function exhibits returns to scale over the relevant range of production, *i.e.*,

   $$\frac{\partial h}{\partial q_j} > 0 \quad \text{and} \quad \frac{\partial^2 h}{\partial q_j^2} < 0,$$

   where h is the firm's production function with respect to factors used and q_j is the jth factor. This assumption prevents the firm from growing to an infinite size.
8. The firm's objective is to maximize after-tax economic profits. Although the validity of this assumption has been seriously questioned in the economics literature [Cyert and March, 1963; Williamson, 1964). it is still a fundamental assumption of firm behavior, particularly in perfectly competitive markets.

The Model for Taxable Income

In order to develop a model in which a firm maximizes its after-tax income, it is necessary to derive an expression for taxable income, since taxes are based on taxable income rather than on economic income. Note that, for the purpose of developing the model, permanent differences and timing differences between financial reporting income and taxable income as defined in APB Opinion No. 11 are ignored. Accordingly, financial reporting income and taxable income are essentially the same. Revenues are recognized in the fiscal period earned; inventory costs become expenses in the same period as the corresponding revenue from the sale of the firm's product; and other costs become expenses in the period incurred.

Revenue may be expressed as $\sum_{i=1}^{n} R_i V_i$ (1)

where

R_i is the unit selling price of the ith product; and V_i is the quantity of the ith factor sold.

$$\text{Variable costs are } \sum_{j=1}^{m} w_j q_j \qquad (2)$$

where

w_j is the unit purchase price of the jth factor; and q_j is the quantity of the jth input purchased.

Note that assumption 5 above also makes these costs period costs, *i.e.*, they become expenses in the period incurred.

The expression for cost of goods sold is somewhat more difficult to develop. Since cost of goods sold = beginning inventory + purchases − ending inventory, expressions for each of these three terms are required. The cost of beginning inventory can be expressed as:

$$(1 - \delta) w_p S_{YB} \qquad (3)$$

where:

w_p is the current year's weighted average unit price for inventory. This amount is the numeraire if the firm uses dollar-value as opposed to physical LIFO, S_{YB} is the beginning inventory in units, or in terms of present year dollars if dollar value LIFO is used; and δ is a number greater than zero, but less than 1 which permits proper LIFO costing of the opening inventory. Accordingly, $(1-\delta)$ may be thought of as a "deflator," which deflates w_p to the price levels which existed during the base period. It is recognized that the "base period" may actually contain inventory layers from several fiscal periods. Therefore, $(1-\delta)$ is really a weighted average of the applicable deflators from each fiscal period contained in S_{YB}.

$$\text{Purchases are } w_p P \qquad (4)$$

where:

P is the physical amount of inventory purchased during the year, or the dollar amount spent for inventory during the year, if the firm uses dollar value LIFO.

The cost of ending inventory is

$$(1-\varepsilon\delta)w_p(S_{YB}+P-D) \qquad (5)$$

where:

D is the physical quantity or dollar value of products sold during the year; and ε is a "LIFO factor" with the following properties:

1. When $P>D$,

$$\varepsilon=\frac{S_{YB}}{S_{YB}+P-D}.$$

This definition guarantees that ending inventory equals $(1-\delta)w_pS_{YB}+w_p(P-D)$, the proper expression for ending inventory when $P>D$. Note that when ending inventory equals $(1-\delta)w_pS_{YB}+w_p(P-D)$, cost of goods sold $=(1-\delta)w_pS_{YB}+w_pP-(1-\delta)w_pS_{YB}-w_p(P-D)=w_pD$.

2. When $P<D$,

$$\frac{S_{YB}}{S_{YB}+P-D}>\varepsilon>1.$$

This definition insures that cost of goods sold will be less than w_pD and that the unit cost of the base period inventory will be less than $(1-\delta)w_p$, when $P<D$. The reason why the unit cost of the base period inventory is less than $(1-\delta)w_p$ when $P<D$ is based on the assumption that the base period contains layers from several fiscal periods and that those from the newer periods have higher costs. When $P<D$, these newest layers become part of cost of goods sold first, thereby leaving the oldest layers with the lowest costs in inventory. Therefore, a higher deflator than $(1-\delta)$ is required to convert current prices to base period prices.

3. When $P<D$, $\varepsilon\rightarrow 1$ as $P\rightarrow D$. Accordingly, if $P<D$, cost of goods sold gets closer to w_pD when P gets closer to D.

This definition gives the firm a *tax* incentive to have the year-end investment in inventories for a given year be no less than the investment was at the beginning of the year. Admittedly, this definition may not precisely reflect reality, especially in situations where inventory prices at year-end are substantially higher than they were at the beginning of the year. In such situations, the deduction for cost of goods sold will substantially increase with greater year-end inventory levels. However, if the firm permits a year-end inventory increase, this level must be maintained in all future years to avoid taxation of inventory liquidation profits. This higher level of inventory will necessitate greater costs for holding that inventory, the present value of which might be greater than the tax benefit of extra deduction. If the present value of the extra holding cost is greater than the tax benefit of the extra deduction, the firm will not permit the year-end inventory investment to increase over that at the beginning of the year. It is this situation which the definition of ε envisions.

The definition of ε approximates reality even more closely if the firm uses dollar-value LIFO and elects the weighted average method of costing current year's purchases in accordance with Reg. §1.472-8(e) (2) (ii) (c). Under this method, it takes a large inventory increase at year-end in order to affect cost of goods sold to any significant degree. Therefore, under this method, it is more likely that the present value of the additional holding cost would exceed the tax benefit of the greater deduction for cost of goods sold.

Based on expressions (3), (4), and (5) above, the expression for cost of goods sold (CGS) can be formulated:

$$\begin{aligned}\text{CGS} &= (1-\delta)w_pS_{YB} + w_pP \\ &\quad - (1-\varepsilon\delta)w_p(S_{YB}+P-D) \qquad (6)\end{aligned}$$

After rearranging terms, equation (6) becomes:

$$\begin{aligned}\text{CGS} &= w_pD \\ &\quad -\delta w_p[S_{YB}-\varepsilon(S_{YB}+P-D)] \qquad (7)\end{aligned}$$

Notice from Equation (7) that given the definition of ε, the last term will drop out when $P \geq D$. Therefore, when $P \geq D$, CGS $= w_pD$. Now w_pD accurately reflects CGS if the firm uses the weighted average method of costing current year's purchases, and is a reasonable approximation otherwise. When $P < D$, the last term in Equation (7) will be a positive number based on the definition of ε. Thus, when $P < D$, CGS $< w_pD$, in accordance with the way LIFO operates in a period of rising inventory prices.

Combining expressions (1), (2) and (7) gives the expression for accounting income, Π_A:

$$\begin{aligned}\Pi_A &= \sum_{i=1}^{n} R_iV_i - \sum_{j=1}^{m} w_jq_j \\ &\quad -(w_pD - \delta w_pS_{YB} - \varepsilon(S_{YB}+P-D)) \\ &= \sum_{i=1}^{n} R_iV_i - \sum_{j=1}^{m} w_jq_j - w_pD \\ &\quad + \delta w_p[S_{YB} - \varepsilon(S_{YB}+P-D)]. \qquad (8)\end{aligned}$$

As previously noted, Π_A also represents taxable income. Therefore, if the tax rate is T, where $0 < T < 1$, the firm will pay $T\Pi_A$ in income taxes for a given year.

The Model for After-Tax Economic Profits

In the absence of income taxation, the firm's objective would be to maximize economic profits subject to the constraint of the firm's production function. In general, under conditions of perfect competition in both the product and factor markets, the problem takes the following form [Henderson and Quandt, 1971, p. 53]:

$$\text{Max}\ \Pi_E = \sum_{i=1}^{n} R_iV_i - \sum_{j=1}^{m} w_jq_j \qquad (9)$$

subject to

$$\begin{aligned}g(V_1, V_2, \cdots, V_i, \cdots, V_n) \\ = h(q_1, q_2, \cdots, q_j, \cdots, q_m) \qquad (10)\end{aligned}$$

where:

Π_E is the economic profits; and g and h consitute the firm's production function.

The production function defines the relationship between factors of production and outputs. Simply stated, the constraint says that the firm can produce several combinations of output given several combinations of inputs, but the firm's level of production is limited by the levels of the various inputs which it utilizes. The firm will utilize inputs only to a certain level, and will not grow to an infinite size because of the assumption that the firm experiences decreasing returns to scale.

Equations (9) and (10) can be easily modified to include inventories. With inventories, Equation (9) becomes:

$$\text{Max}\ \Pi_E = \sum_{i=1}^{n} R_i V_i - \sum_{j=1}^{m} w_j q_j - w_p D \qquad (11)$$

where the only new term is w_pD, the cost of inventory sold during the year, stated at the weighted average of the current year's inventory prices. From an economic viewpoint, it is reasonable to state cost of goods sold in terms of current year's prices regardless of when the actual inventory was purchased if the firm is viewed as having an infinite life. A firm cannot distribute inventory profits as dividends without distributing part of its real capital which it could otherwise use to replace inventory. Accordingly, inventory profits are not viewed as economic profits if one adheres to the definition of economic profits as being those which can be distributed to shareholders without reducing the firm's capital resources. If it is assumed that the firm has an infinite life because of the desires of its shareholders, it may also be assumed that the shareholders would be opposed to the distribution of capital since the distribution of capital would impair the firm's ability to generate profits in the long run. Therefore, the shareholders would not cause the firm to distribute inventory profits, but would cause the firm to retain them for capital purposes. In applying this concept to the model, the weighted average of the current year's purchase prices has been taken as a reasonable surrogate for replacement cost.

The constraint can be modified from Equation (10) to include inventories. When modified, the constraint becomes

$$g(V_1, V_2, \cdots, V_i, \cdots, V_n) = h(q_i, q_2, \cdots, q_j, \cdots, q_m) + KD \qquad (12)$$

where K is a constant which reflects usage of inventory (in units or dollars) per unit of output. This formulation is a result of assumption 4, which states that each finished product requires a fixed amount of inventory. The factors of production consumed in ordering and holding inventories are included in the q_js.

Equations (8) and (11) can be combined to express the firm's objective function if its objective is to maximize economic profits while using LIFO for tax purposes. Thus, the firm's objective function becomes

$$\begin{aligned}\text{Max}\ \Pi_E = \sum_{i=1}^{n} R_i V_i - \sum_{j=1}^{m} w_j q_j - w_p D - T \\ \cdot \left(\sum_{i=1}^{n} R_i V_i - \sum_{j=1}^{m} w_j q_j - w_p D \right. \\ \left. + \delta w_p [S_{YB} - \varepsilon(S_{YB} + P - D)] \right) \qquad (13)\end{aligned}$$

After rearranging terms, Equation (13) becomes

$$\begin{aligned}(1-T)\left(\sum_{i=1}^{n} R_i V_i - \sum_{j=1}^{m} w_j q_j - w_p D \right) \\ - T\delta w_p [S_{YB} - \varepsilon(S_{YB} + P - D)] \qquad (14)\end{aligned}$$

Since the firm will save taxes, and hence increase after-tax profits if it uses some of its factors of production to control year-end inventory levels for investment), the constraint must reflect this fact. Therefore, Equation (12) must be changed to

$$g(V_1, V_2, \cdots, V_n, P) = h(q_1, q_2, \cdots, q_j, \cdots, q_m) + KD \qquad (15)$$

where the only new term in the constraint is P. In terms of the model, P can be viewed as an additional "product" which the firm may produce if it can get revenue from its "sale." It should be emphasized that the firm's production function implies that a certain amount of factors will be used for "normal" inventory order and holding costs, "normal" meaning the level of these costs which the firm will incur through the use of an inventory optimization procedure in the absence of LIFO tax considerations. Therefore, the constraint establishes the relationship between *P*, or extra purchases made by the LIFO firm in order to maintain year-end inventory levels and the extra factors which must be consumed to purchase and maintain these extra inventories. Although, in real terms, *P* is not a product which can be sold, the maintenance of year-end inventory levels, like the sale of products, increases the firm's after-tax profits, at least up to a point. Since a firm will allocate factors of production to any activity which will increase profits, it is reasonable to expect that some resources may be allocated to inventory maintenance.

This expectation can be demonstrated analytically by maximizing after-tax economic profits (Equation (14)) subject to the constraint of Equation (15). The demonstration takes the form of comparing profit-maximizing choices of factors of production and products which the firm produces under a LIFO tax system with the choices which the same firm will make in the absence of a LIFO tax system. The choice of the appropriate combination of factors of production is rigorously defined as the marginal rate of technical substitution (MRTS). The MRTS may be thought of as measuring the reduction in one factor input per unit increase in another that is just sufficient to maintain a constant level of production. The choice of which products to produce is reflected in the marginal rate of product transformation (MRPT), which measures the reduction in one product per unit of increase in another that is just sufficiently maintained by a constant level of production. The solution of Equation (14) subject to the constraint of Equation (15) gives the following profit-maximizing conditions concerning MRTS and MRPT:

$$\mathrm{MRTS}_{q_j/q_{j+1}} = \frac{w_j}{w_{j+1}} \qquad (16)$$

$$\mathrm{MRPT}_{V_i/V_{i+1}} = \frac{R_i}{R_{i+1}} \qquad (17)$$

$$\mathrm{MRPT}_{V_i/P} = \frac{(1-T)R_i}{T\delta W_p \varepsilon} \qquad (18)$$

(The reader who is interested in the mathematical development of these conditions should consult the Appendix.)

Equation (16) states that the profit-maximizing MRTS between any two factors is the one which is equal to the ratio of the factors' prices. Any other MRTS will be a more costly means of achieving the same level of production. Equation (17) states that the profit-maximizing MRPT is the one which is equal to the ratio of the products' prices, since any other MRPT results in lower total sales revenue for a given level of production. Equation (18) is especially interesting, for it demonstrates that the LIFO firm will "produce" some amount of *P*, or use some of its productive resources to maintain year-end inventory levels as a result of the fact that the year-end inventory maintenance activity increases after-tax profits.

These results should be compared with analogous results for the same firm if it operates in a tax-free environment in order to determine the effects, if any, which LIFO taxation has on resource allocation behavior. In a tax-free environment, the analogous profit-maximizing conditions are:

$$\mathrm{MRTS}_{q_j/q_{j+1}} = \frac{w_j}{w_{j+1}} \tag{19}$$

$$\mathrm{MRPT}_{V_i/V_{i+1}} = \frac{R_i}{R_{i+1}} \tag{20}$$

$$\mathrm{MRPT}_{V_i/P} = \frac{R_i}{0} = \infty \tag{21}$$

(Again, the mathematical development may be found in the Appendix.)

When these results are compared with those obtained in the LIFO-tax model, one observes that the MRTS for all factors and the MRPT for *real* products are identical in both cases. The difference between the two cases lies in Equation (21) in the tax-free case as opposed to the analogous result (Equation (18)) in the LIFO tax case. Equation (21) indicates that in the tax-free case, the firm will use all of its resources to produce real products rather than maintain year-ending inventories, since there is no economic benefit to the firm which comes as a result of year-end inventory maintenance. This result differs from the results of Equation (18), which indicates that the same firm, when operating in a LIFO-tax environment, *will* use some of its resources to maintain year-end inventory levels.

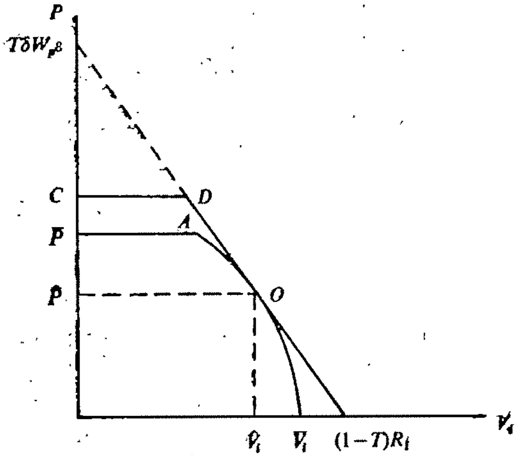
The implications of these results for economic efficiency can be clearly seen if either the level of factors consumed in production or goods produced are held constant across the two economic environments. The results indicate that if factor utilization is held constant, the same firm operating in a LIFO-tax environment would produce a lesser quantity of real goods than it would produce in tax-free environment. This conclusion is based on the fact that if the level of factor utilization is held constant across environments, and the firm uses some of these factors to maintain inventory levels when operating in the LIFO-tax environment, there remains a lesser quantity of factors available for production of real goods. The resources used to maintain inventory levels would be used to produce real products if the same firm were operating in a tax-free environment. An analogous argument can be made if the level of goods produced is held constant across environments. In this situation, the firm operating in the LIFO-tax environment will consume more resources to produce a given level of real goods than it would if it were operating in a tax-free environment, since some resources will be used for year-end inventory maintenance. However, the same economic result is obtained no matter whether one holds constant the level of factors utilized or goods produced. This result is that the firm operating in a LIFO-tax environment will use more resources per unit of goods produced than that firm would use in a tax-free environment. Accordingly, LIFO promotes an inefficient utilization of resources, the term "inefficient" being used here in a nontechnical sense.

Production Effects and Pareto-optimality

Although it was asserted that LIFO-taxation causes an "inefficient" allocation of resources, using a nontechnical definition of efficiency, it can be demonstrated that the allocation of resources is inefficient in a technical sense, the term "efficient" being synonymous with "Pareto-optimal." Pareto-optimality is the well-known condition in which it is not possible to make one person better off economically without making somebody else worse off. It has been demonstrated [Graaff, 1957] that, in the absence of externalities, perfect competition results in a Pareto-optimal allocation of resources; hence, the justification for assumptions 2 and 3 with respect to the model. One of the necessary conditions for Pareto-opimality which is satisfied by perfect competition is that for any pair of products, MRPT for firms must equal the marginal rate of substitution (MRS) for consumers. (For a proof of this condition see, for example, Cohen and Cyert, 1965, p. 292.) MRS measures the number of units of one product or service which a consumer must sacrifice per unit of another product or service gained so as to maintain a constant level of satisfaction. Note that if the MRS for consumers does not equal MRPT for producers, the firm can increase consumer utility without causing a change in its own resource utilization merely by changing the combination of products it produces with a given amount of factors of production. For the firm which operates in a LIFO-tax environment, one of the "products" which will be produced is year-end maintenance, a "product" which presumably has no utility to consumers. Therefore, consumers' MRS of any good for inventory maintenance should be infinite; that is to say that consumers prefer any amount of real goods to inventory maintenance. On the other hand, the MRPT of inventory maintenance into any real good will not be infinite for the firm which operates in the LIFO-tax environment. Since the MRS for consumers does not equal the MRPT for producers, the resulting allocation of resources in the LIFO-tax environment is not Pareto-optimal. To state the results more intuitively, given the same level of productive resources for the firm, consumers will be made better off economically if the firm uses all of the resources to produce real products instead of using some of them for inventory maintenance.

FIGURE 1

After-tax Economic Profits Perfect Competition



These results can be seen graphically by referring to Figure 1. In the diagram, $\bar{P}\bar{V}_i$ is the production possibilities frontier for all combinations of P (inventory maintenance) and any real product V_i. Therefore, given a certain fixed level of productive inputs, the firm has the technology to produce any of the combinations of P and V_i lying on or within the curve $\bar{P}\bar{V}_i$. The curve has a kink in it at point A due to the fact that, in any realistic situation, firm can control its year-end inventories in an effective way with only part of its resources. Any additional investment of resources into the LIFO inventory maintenance function beyond this amount will produce no additional tax benefit. Since the firm has no incentive to spend more for inventory maintenance than is required, it will not choose a combination of P and V_i lying on PA. Furthermore, the firm has no incentive to choose a combination of P and V_i lying within $\bar{P}\bar{V}_i$ since it can increase its production and sales and hence profits given the same level of inputs by moving on to the production possibilities frontier. Therefore, the firm will choose some combination of P and V_i lying on the section of the frontier $A\bar{V}_i$.

The solid portion of line

$$T\delta w_p g(1-T)R_i$$

shows the various combinations of P and V_i which will contribute a given level of after-tax income to the firm. As such, it is analogous to the isorevenue curve which is used in graphical representations of the optimal mix of two outputs or products. $T\delta w_p\varepsilon$ may be thought of as the amount of savings in taxes which will accrue to the firm if it increases its holdings of year-end inventory by one unit over that which the firm would have at year-end if it did not purchase the unit. Since, based on the model, the firm will have no additional tax benefit from holding inventory, once year-end inventory in units equals or exceeds beginning inventory, any additional use of resources to purchase and hold more inventory will result in a decline in revenue, due to the further decrease in the manufacture and sale of V_i without any further tax benefit from the diversion of resources to P. The dotted portion of the line shows this inferior region, while the segment CD shows the total revenue which results when year-end inventory is increased beyond the point where it generates tax benefits. Since the relevant segment of the total revenue line (C to $(1-T)R_i$) is tangent to the production possibilities frontier, it is the maximum total revenue which the firm can achieve with a given level of productive inputs. Accordingly, the diagram depicts the profit-maximizing solution.

The profit-maximizing solution requires the firm to produce $\hat{V}_i$ units of V_i, as shown in Figure 1. However, in the absence of LIFO taxes, the firm would produce $\bar{V}_i$ units of V_i, since it would have an economic incentive to produce real goods, but no economic incentive to maintain LIFO inventories. Accordingly, the presence of LIFO taxes has resulted in a decline in the production of real goods in the amount of $\bar{V}_i - \hat{V}_i$. Assuming that consumers derive no utility from inventory maintenance, this diversion of resources from the production of goods to inventory maintenance results in a decrease in economic welfare.

SUMMARY AND POLICY IMPLICATIONS

It has been demonstrated that an income tax system which permits the use of LIFO introduces an inefficiency into the allocation of an economy's productive resources, by causing year-end inventory maintenance to be a profitable endeavor. It has also been indicated that the official Congressional rationale for permitting the use of LIFO for tax purposes is based on equity considerations, rather than on a view that the reallocation of resources caused by LIFO is a desirable economic objective based on some other social or economic criterion. If it is true that the reallocation of resources caused by LIFO has no economic or social justification, then perhaps other methods of accounting for inventories which provide protection against inflation, but which do not promote resource allocation distortions should be investigated.

One such alternative method of accounting for inventories for tax purposes is contained in the Report of the Committee of Inquiry into Inflation and Taxation (Australia). This report, which is also called the Mathews Report, contains a recommendation which allows a deduction for:

> the difference between opening stocks (inventories) valued at their actual price and opening stocks valued at the same prices as closing stocks, using actual stock schedules and price lists as the basis of the calculation. (The Mathews Report: Analysis, p. 12).

Essentially, the Mathews Report permits taxpayers to account for inventories using replacement cost based upon verifiable evidence. Therefore, taxpayers are protected from being taxed on inventory profits, without having new opportunities for tax avoidance.

The Committee did consider permitting the use of LIFO, but rejected it for two reasons. The first reason is that, according to the Committee, the cost of sales valuation adjustments proposed in the Report would be easier than LIFO for taxpayers to apply since they involve fewer computations and the need to maintain less complicated records [Mathews Report: Analysis, p. 59]. This is especially true for taxpayers who use dollar-value LIFO, which is probably the method used most in practice. Secondly, the Committee felt that "the proposed stock revaluation method provides a more accurate measure of the current value concept of income than LIFO, while avoiding the capricious effects produced by LIFO in the downward phase of the stock cycle" [Mathews Report: Analysis, p. 59]. Accordingly, the Committee seemed to recognize the fact that LIFO protects taxpayers from inflation only when year-end inventory levels are maintained and wished to avoid that problem.

The objectives of the section of the Mathews Report concerning inventories seem to be based on both equity and efficiency considerations, since the recommendation protects taxpayers from inflation without causing a reallocation of resources into the year-end inventory maintenance function. Since the Report has not been enacted in its recommended form, it is impossible to determine empirically whether the legislation has had the desired effects. However, these provisions do seem to have merit from a public policy viewpoint.

APPENDIX

Mathematical Development of the Conditions for Maximization of After-Tax Economic Profits and Effects on Production

This section will demonstrate analytically that the LIFO firm will utilize some part of its productive resources to maintain year-end inventory levels. As a consequence of this activity, the firm will produce a smaller quantity of real finished products than the same firm would produce if it operated in a tax-free environment.

In order to derive the profit-maximizing conditions, Equations (14) and (15) can be set up in Lagrangian multiplier form. Define L to be the function. Then,

$$\begin{aligned} L=(1-T)\left(\sum_{i=1}^{n} R_iV_i-\sum_{j=1}^{m} w_jq_j-w_pD\right) \\ -T\delta w_p(S_{YB}-\varepsilon(S_{YB}+P-D)) \\ -\lambda g(V_1, V_2,\cdots, V_i,\cdots, V_n, P) \\ -h(q_1, q_2,\cdots, q_j,\cdots, q_m) \\ -KD=0 \end{aligned} \tag{A.1}$$

Taking the partial derivatives with respect to each of the variables and setting the results equal to zero gives:

$$\frac{\partial L}{\partial V_i}=(1-T)R_i-\frac{\partial g}{\partial V_i}=0 \tag{A.2}$$

$$\frac{\partial L}{\partial V_{i+1}}=(1-T)R_{i+1}-\frac{\partial g}{\partial V_{i+1}}=0 \tag{A.3}$$

or

$$\frac{\partial g/\partial V_i}{\partial g/\partial V_{i+1}}=\frac{R_i}{R_{i+1}} \tag{A.4}$$

Equation (A.4) is the familiar condition that for any two outputs of real products, the firm will equate MRPT to the ratio of the products' selling prices.

In addition, the MRPT of any product V_i to P can be computed by taking the relevant partial derivatives, setting them equal to zero and forming the ratio:

$$\frac{\partial L}{\partial V_i}=(1-T)R_i-\lambda\frac{\partial g}{\partial V_i}=0 \tag{A.5}$$

$$\frac{\partial L}{\partial P}=T\delta w_p-\lambda\frac{\partial g}{\partial P}=0 \tag{A.6}$$

or

$$\text{MRPT}_{V_i/P}=\frac{\partial g/V_i}{\partial g/P}=\frac{(1-T)R_i}{T\delta w_p\varepsilon}. \qquad \text{(A.7)}$$

Since both the numerator and denominator of the ratio in Equation (A.7) are positive numbers, some positive amount of P will be "produced." To state the result more formally, profit maximizing conditions require the LIFO firm to use some of its factors of production to maintain year-end inventory levels. This result consistent with the tax planning idea disseminated by the professional literature.

To look at the optimal level of resource utilization by the LIFO firm, one must compute the MRTS of any two pairs of factors. The MRTS can be computed as follows:

$$\frac{\partial L}{\partial q_j}=(1-T)w_j+\lambda\frac{\partial h}{\partial q_j} \qquad \text{(A.8)}$$

$$\frac{\partial L}{\partial q_{j+1}}=(1-T)w_{j+1}+\lambda\frac{\partial h}{\partial q_{j+1}} \qquad \text{(A.9)}$$

Therefore,

$$\text{MRTS}_{q_j/q_{j+1}}=\frac{\partial h/\partial q_j}{\partial h/\partial q_{j+1}}=\frac{w_j}{w_{j+1}} \qquad \text{(A.10)}$$

Equation (A.10) is the familiar result that for the profit maximizing firm, the MRTS for any two factors of production is equal to the ratio of those factors' prices.

In order to see the effects of LIFO on resource allocation, the MRPT's and MRTS's must also be derived for the firm operating in a tax-free environment. This can be accomplished by setting up the following Lagrange multiplier problem based on Equations (11) and (15), taking the relevant partial derivatives, setting the results equal to zero, and forming the appropriate ratios.

$$\begin{aligned}\text{Max M}= &\sum_{i=1}^{n} R_iV_i-\sum_{j=1}^{m} w_jq_j-w_pD-\mu\\ &\cdot(g(V_1,V_2,\cdots,V_i,\cdots,V_n,P)\\ &-h(q_1,q_2,\cdots,q_j,\cdots,q_m)\\ &-KD)=0 \qquad \text{(A.11)}\end{aligned}$$

where

M is the function, and μ is the undetermined Lagrange multiplier.

After doing the required mathematics, the following results are obtained:

1. $\text{MRPT}_{V_i/V_{i+1}}=\dfrac{R_i}{R_{i+1}},$ (A.12)
2. $\text{MRTS}_{q_j/q_{j+1}}=\dfrac{w_j}{w_{j+1}},$ and (A.13)
3. $\text{MRPT}_{V_i/P}=\dfrac{R_i}{0}=\infty\cdot$ (A.14)

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A Comparison of General Price Level and Historical Cost Financial Statements in the Prediction of Bankruptcy

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ABSTRACT: The objective of this study is to compare the prediction of bankruptcy based on ratios computed from GPL financial statements to the prediction based on ratios computed from traditional historical cost financial statements. A sample of an equal number of bankrupt and non-bankrupt firms was chosen, and the financial statements were adjusted for the effects of general price level changes. Financial ratios were computed from both the traditional and GPL financial statements. Discriminant analysis was used for the bankruptcy classifications. The authors found that both GPL and traditional ratios exhibited the ability to predict bankruptcy. In spite of the sizable differences in magnitude that existed between GPL and historical cost financial statements, little difference was found in the bankruptcy predictions. GPL data were shown to be consistently neither more nor less accurate than historical data for predictions of bankruptcy.

THE accounting profession has attempted several times to deal with the impact of inflation in financial statements. One method frequently proposed to account for changes in the value of the dollar is to adjust historical cost (HC) statements for changes in the general price level (GPL). Unfortunately, limited empirical research has been conducted to provide some insights into how useful GPL adjusted statements are to statement users.

The relevant user groups in this study are assumed to be the set of present and potential creditors and the set of all present and potential stockholders. These two sets of investors evaluate past performance, including financial statements, in order to evaluate the future, *i.e.*, the accounting data are used because they facilitate predictive ability. Accounting data are more useful to a stockholder or creditor if his prediction of future events is improved. The prediction of bankruptcy is one future event of interest to nearly every investor and is the prediction examined herein.

A number of research studies have been conducted to determine if ratios computed from a firm's financial statements could be used for making predictions. The focus of these studies has been on the prediction of bankruptcy using HC

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financial ratios. In particular, Beaver [1966], Altman [1968], and others have been able to predict bankruptcy up to five years before the actual event with a 70–90 percent success rate. The objective of this study is to compare the prediction of bankruptcy based on ratios computed from GPL financial statements to the prediction of bankruptcy based on ratios computed from HC financial statements.

The paper is composed of four sections. In the first section, the sample selection, data collection, GPL adjustment procedure and methods of developing bankruptcy predictions are discussed. This is followed by sections discussing the results of the GPL adjustment procedure, the results of the bankruptcy predictions and summary and conclusions.

METHODOLOGY

Sample Selection

The general approach to sample selection was to identify a group of bankrupt firms and then to choose an equal number of non-bankrupt firms. The firms identified as bankrupt were firms that had notified the SEC on Form 8-K or Form 10-K during the years 1971–75 that legal bankruptcy proceedings had begun. These years were selected in order to examine bankruptcies that occurred during a recent period of high inflation. The sample was limited to firms that were listed in the *Moody's Industrial Manual* and for which financial statements were available for four years prior to the year in which bankruptcy notices were filled with the SEC. A total of 30 bankrupt firms were identified that fulfilled the sample selection criteria. Three firms were identified as bankrupt in 1975, ten in 1974, eight in 1973, seven in 1972, and two in 1971.

An equal number of non-bankrupt firms was selected for the sample. Previous research has suggested that care must be taken when choosing a sample of non-bankrupt firms to complement the bankrupt firms [Elam, 1975; Beaver, 1966]. It was important that the sample of firms be as similar as possible in all respects except for their financial ratios. A paired sample design was used for that reason. For each bankrupt firm, a non-bankrupt partner firm was chosen with these characteristics:

1. The non-bankrupt firm was in the same industry as its bankrupt partner, as indicated by their three-digit industry classification numbers.
2. Within a given industry, the non-bankrupt firm with the asset size most similar to its bankrupt partner was chosen. Asset size, rather than net sales, was chosen as the matching criterion since it tends to be more stable across time [Beaver, 1966; Elam, 1975].
3. Data must be available for the four periods preceding its partner's bankruptcy.

The bankrupt firms and the matched non-bankrupt partner are identified in Appendix A. Each firm selected for this study was a large industrial firm whose stock was publicly traded. The mean total asset size of the bankrupt firms was $90 million and $90.4 million for the non-bankrupt firms. Twenty-four industrial classifications were represented in the 30 bankrup firms. The highest number of firms from any one industrial classification was four. The bankrupt firms and their non-bankrupt partners were from the same industry and year in every instance except one (Rosenau Brothers). A non-bankrupt firm could not be obtained that had an asset size similar to that bankrupt firm. A firm from a closely related industry was chosen (Londontown Manufacturing).

It is difficult to state with confidence that the sample was representative of all firms classified as industrial. The nonrandom selection criteria, while necessary, have dictated a somewhat larger than "average" size for the firms. Further, not all firms are required to provide Form 10-K and Form 8-K data, and firms that did provide such data may not have been representative of all United States industrial firms.

Data Collection

HC financial statement data were collected for the sample firms for four years. A four-year time period was chosen because of the volume of data to be collected (a total of 240 financial statements was needed) and because previous studies indicated that financial ratios from years beyond four years prior to bankruptcy have very limited predictive ability. The primary sources of financial statement data for the firms were Form 10-K financial statements and annual reports. The abbreviated financial statements provided by *Moody's* were used as a supplement when those reports were not available. As a third source, the researchers attempted to obtain the financial statements of the firms by contacting their corporate headquarters. Three financial statements could not be obtained from any source. The statements unavailable were all for bankrupt firms for the year immediately preceding bankruptcy. These companies were kept in the study to increase the sample size.

GPL Adjustment Procedures

GPL financial statements were developed from the HC data using a computer program developed by Petersen [1971]. With three exceptions, the GPL adjustments were made in accordance with the FASB Exposure Draft. The three exceptions all dealt with the determination of the monetary and nonmonetary status of certain accounts:

1. For marketable securities, the Exposure Draft recommended that stock normally be treated as non-monetary, bonds being held for short periods as non-monetary, and bonds being held for longer periods as monetary. It often was difficult to determine the type of security, and often it was impossible to discern the intentions of management. It was assumed that the majority of marketable securities holdings were composed of long-term bonds. For these reasons, all marketable securities were treated as monetary and adjusted accordingly.
2. The Exposure Draft states that preferred stock may be either monetary or non-monetary, depending upon its characteristics. However, it is likely that most preferred stock has the characteristics of a non-monetary security. For that reason, all preferred stock was treated as non-monetary and adjusted accordingly.
3. In the case of an investment in unconsolidated subsidiary carried at equity in the financial statements of the investors, the Exposure Draft requires that the financial statements of the investee be restated and then the equity method applied. This was not feasible in this case, and all investments were treated as non-monetary.

Quarterly gross national product implicit price deflators were used as the price indices in the manner suggested in the FASB Exposure Draft [1974]. GPL adjustments were made for all monetary and non-monetary accounts for each year. Each year's financial statement was rolled forward so that all were stated in current purchasing power dollars; *i.e.*, the dollars of the most recent financial statement.

The means used to compute the GPL adjustments were made for all monetary and non-monetary accounts for each been extensively validated. Petersen [1971] validated the program first with the use of XYZ Firm from APB State-ment No. 3, and then against the detailed restatements McKenzie [1970] developed for a specific industry. Petersen [1971, p. 77] concluded that the restatement procedure estimates satisfactorily the impact of GPL movements. Other GPL estimation procedures have been used by Davidson and Weil [1975a, 1975b, 1975], Harmelink and Kintzele [1975], Samuelson [1972], and Parker [1977].

Variables

A series of 32 financial ratios were computed for each of the four years prior to bankruptcy after the HC and GPL financial statements were constructed. Each of the ratios was selected because of its use in previous studies dealing with bankruptcy and/or business failure.[1] Table 1 lists the financial ratios used in this study to form the basis of the bankruptcy prediction.

TABLE 1

THIRTY-TWO FINANCIAL RATIOS COMPUTED FROM THE FINANCIAL STATEMENTS

Ratio Number	*Description*
001	Current ratio
002	Cash to current liabilities
003	Cash to total assets
004	Quick assets to current liabilities
005	Quick assets to total assets
006	Current assets to total assets
007	Working capital to total assets
008	Cash flow to sales
009	Cash flow to total assets
010	Cash flow to net worth
011	Cash flow to total liabilities
012	Net income to sales
013	Net income to total assets
014	Net income to total liabilities
015	Current liabilities to total assets
016	Long-term liabilities to current assets
017	Total liabilities to total assets
018	Total liabilities+preferred stock to total assets
019	Net worth to total liabilities
020	Net worth to long-term liabilities
021	Net worth to fixed assets
022	Net income to net worth
023	Sales to cash
024	Sales to accounts receivable
025	Sales to inventory
026	Sales to quick assets
027	Sales to current assets
028	Sales to working capital
029	Sales to total assets
030	Cash interval
031	Defensive interval
032	Sales to net worth

Bankruptcy Predictions

Predictions of bankruptcy were developed using linear multiple discriminant analysis (MDA).[2] The dependent variable was bankruptcy or non-bankruptcy. The independent variables were the financial ratios from either HC or GPL financial statements. Two discriminant functions were developed for each year prior to bankruptcy. One function was based upon the HC financial ratios and the other was based upon the ratios from the GPL financial statements. An initial set of eight functions was formed, two for each year times four years. All 60 firms were used to develop each discriminant function. The 60 firms were then classified as bankrupt or non-bankrupt on the basis of each function.

Four approaches were used to determine which financial ratios should be used in the discriminant function. In the first approach, the stepwise technique was used to select the optimal set of variables. The result is optimal (rather than maximal) because not every subset is considered. A maximal solution would require testing every possible subset of the 32 ratios to determine the very best results. The stepwise process begins by choosing the variable which has the largest value of a user-determined criterion. This variable is then paired with each of the remaining variables to determine which pair provides the best criterion value. The procedure continues until all variables are selected or no additional variables meet the minimum criterion to enter.[3]

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[1] For a summary of the ratios used in 11 previous studies and their ranking in importance in each study, see Bazley [1972, pp. 47–50].

[2] Except were noted, the program used to develop the discriminant functions was version six of the Statistical Package for the Social Sciences [Nie *et al.*, 1975, pp. 434–67]. The SAS package was used for a limited amount of follow-up work [Barr *et al.*, 1976].

The SPSS Discriminant Package allows the user the choice of several selection criteria. The method chosen for this study was "WILKS." When METHOD =WILKS, the criterion is the overall multivariate F ratio for the test of differences among the group centroids. The variable which maximizes the F ratio also minimizes Wilks' lambda, a measure of group discrimination [Nie *et al.*, 1975, p. 447]. For an in-depth analysis of the use of the F statistic in the stepwise regression context, the reader should refer to Pope and Webster [1972].

The problem with the stepwise approach was that if the functions developed from the HC and GPL data were dissimilar, it was difficult to determine if the differences in predictive accuracy were the results of differences between the models or between the valuation system. An example may make the point more clear. Suppose the GPL function for a given year contained ratios x_1, x_2, and x_8, and the historical cost function for the same year contained ratios x_1, x_7, and x_{11}. Also suppose the GPL function predicted A percent accurately and the historical cost function predicted B percent accurately, and A was greater than B. The researcher then could conclude that the particular set of ratios computed from the GPL data was a better predictor of bankruptcy than the set from historical cost data; *i.e.*, the GPL *model* was better than the historical cost *model*. The researcher could not conclude the GPL information is better than historical cost information since the models do not contain the same information.

To avoid this problem, three other approaches were used to select a set of ratios that were used in both the GPL and HC prediction models. These three approaches numbered two through four are:

Approach 2. In this approach all 32 ratios were used in each discriminant function. Thus, the models developed from GPL and HC data were identical. The models developed in this approach would be effective but very inefficient since many of the ratios are likely to contain nearly the same information.

Approach 3. A set of selected variables was chosen based upon the univariate F ratio of each financial ratio in the first year prior to bankruptcy. A univariate F ratio indicates the ability of each ratio individually to predict group membership. The 13 ratios that exhibited the highest univariate F ratio for both GPL and HC data in the first year prior to bankruptcy were chosen and used to develop two discriminant functions for each year.

The models developed in this approach do not necessarily give the most accurate predictions of bankruptcy, even in the first year, because the univariate F ratio indicates only the individual information value of a ratio. A ratio may be a very good predictor by itself but not be useful when included in a multivariate model

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[3] In all cases in this study, the criterion F ratio for a variable to enter or be removed was 1.0.

[Cockran, 1964]. While both GPL and HC predictors are based upon the same set of variables in approach three, there is no assurance that the variables are the best for either data set.

Approach 4. In this approach, linear multiple regression, discriminant analysis, and the judgment of the researcher were used. The purpose of the regression analysis was to indicate which financial ratios were the most important. Two stepwise linear regressions were conducted, one regression for all four years' GPL financial ratios and another for all four years' HC financial ratios. On the basis of the regression equations, a set of seven financial ratios was chosen for use in discriminant functions based on the following considerations: (1) the order in which the variables entered the regression equations; (2) the change in the coefficient of determination (R^2) that resulted from the addition of the variable to the regression equation; (3) the relative importance of each variable as indicated by the standardized regression coefficients (*betas*); and (4) the F ratio conducted upon each individual regression coefficient.

The seven ratios were analyzed by the researchers to determine whether they constituted a reasonable bankruptcy prediction model. The researchers desired a model that (1) was important in a statistical sense, and (2) an investor would accept as helpful in predicting bankruptcy. Accordingly, four ratios were chosen as additions to the seven ratios initially chosen. Two were chosen because they had been useful in previous studies, and two were chosen to form a balance between the income-oriented and liquidity-oriented ratios. Thus, the model was developed from 11 ratios.[4]

RESULTS OF THE GPL ADJUSTMENTS

The results of the GPL adjustments are compared to the HC statements to assess the magnitude of the changes resulting from the GPL adjustment procedure. A summary of the results of the GPL estimation procedures follows:

1. In 48 of the 60 firms, the average GPL net income was less than the average HC net income. In 18 of the 60 firms, the magnitude of the difference between the HC and GPL net incomes was less than 10 percent. The other 42 firms had more sizable differences. The percentages ranged from −271 to +284. For three firms, a positive average HC net income was adjusted to a negative GPL net income. Only for one firm did the opposite occur; *i.e.*, GPL net income was positive and HC net income was negative. The average net income (loss) figures were:

	HC	*GPL*	*Percent that GPL was Higher (Lower) Than HC*
	($000)	($000)	
Bankrupt Firms Firms	$(945)	($1,299)	(37.5)
Non-bankrupt Firms	3,473	3,138	(10.7)

2. The standard deviation of GPL net income was larger than the standard deviation of HC net income in 54 firms.
3. Two individual items were the most significant for most companies: depreciation and the purchasing power gain or loss on monetary items.

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[4] Another alternative was possible but was not used in this study. The combined use of principal component and factor analysis appears to be a method that would be useful in reducing dimensionality. See Libby [1975] and Ketz [1977].

4. The GPL adjustment procedure resulted in an average net monetary gain for 43 of the firms. The average purchasing power gain or loss as a percentage of GPL net income was less than 10 percent for 23 firms. The total average purchasing power gain or loss for all firms as a percentage of the total average GPL net income was 55.2 percent for the bankrupt firms and 20.2 percent for the non-bankrupt firms.
5. For every firm, the average GPL depreciation was higher than the average HC depreciation. The percentages generally ranged from 15 to 35 percent, and the highest was nearly 60 percent. The increase in GPL adjusted depreciation more than offset the net purchasing power gains and resulted in most, but not all, firms having GPL net incomes lower than their HC net incomes. Further, the depreciation adjustment had a related impact on the balance sheet and affects the balance sheet ratios. The average HC and GPL depreciation costs were:

	Average HC	*Average GPL*	*Percent that GPL was Higher (Lower) Than HC*
	($000)	($000)	
Bankrupt Firms	$1,788	$2,201	23.1
Non-bankrupt Firms	2,039	2,756	35.1

BANKRUPTCY PREDICTIONS

The correct predicted group membership (number of firms classified correctly as bankrupt and non-bankrupt) based on the discriminant functions developed from the HC and GPL data is presented in Table 2. The total sample size is 60 in all cases except in the year preceding bankruptcy in which financial statements for three firms could not be obtained. The overall percentage of firms correctly classified is presented in parentheses under each year and was computed as the number of firms correctly classified divided by the total number of firms classified. The percentages reported in Table 2 are based on the discriminant functions developed from the sample data and the classifications of that same sample data.[5]

Before the results of each approach are presented, it should be noted that the results of the HC bankruptcy predictions of all approaches are quite consistent with those of previous bankruptcy prediction studies. The results of Altman [1968], Blum [1974], Deakin [1972], Edmister [1972], and others are, in general, not different from the results of this study with regard to HC ratios. Apparently, it is possible to accurately classify firms as bankrupt or nonbankrupt on the basis of HC financial data using the discriminant analysis technique.

Approach One Results

The ratios computed from the HC and GPL data that entered the functions as selected by the stepwise technique, the partial *F* ratios, and the standardized

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[5] Whenever discriminant functions are developed and used to classify the original sample, an element of bias exists in the results. In past studies several methods have been used to "validate" the results. One alternative is the approach suggested by Lachenbruch [1967, pp. 639–45]. The method requires the researcher to develop a discriminant function on all but one observation and use the function to classify that point. The process is then repeated holding out a different observation each time.

The authors have used the more common split-sample or Holdout method. The results obtained on the holdout sample are not very different from the results reported in Table 2. On the basis of the validation work conducted, the authors believe the percentages misclassified by HC and GPL are "biased," but biased to nearly the same degree. The primary purpose of the study is to compare HC and GPL and the results in Table 2 can be used for that purpose.

TABLE 2

CLASSIFICATION OF THE SAMPLE FIRMS BY THE HC AND GPL DISCRIMINANT FUNCTIONS DEVELOPED FROM THE FOUR APPROACHES

	Approach 1				*Approach 2*				*Approach 3*				*Approach 4*			
	B		*N*		*B*		*N*		*B*		*N*		*B*		*N*	
Year Prior to Bankruptcy	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Historical Cost																
1*	23	85.2	28	93.3	23	85.2	30	100.0	23	85.2	28	93.3	23	85.2	27	90.0
		(89.5)				(93.0)				(89.5)				(87.7)		
2	24	80.0	26	86.7	28	93.3	26	86.7	26	86.7	24	80.0	24	80.0	26	86.7
		(83.3)				(90.0)				(83.3)				(83.3)		
3	24	80.0	26	86.7	23	76.7	25	83.3	23	76.7	24	80.0	24	80.0	21	70.0
		(83.3)				(80.0)				(78.3)				(75.0)		
4	26	86.7	23	76.7	26	86.7	24	80.0	24	80.0	23	76.7	22	73.3	18	60.0
		(81.7)				(83.3)				(78.3)				(66.7)		
General Price Level																
1*	22	81.5	28	93.3	24	88.9	29	96.7	23	85.2	28	93.3	22	81.5	29	96.7
		(87.7)				(93.0)				(89.5)				(89.5)		
2	27	90.0	26	86.7	29	96.7	27	90.0	24	80.0	23	76.6	25	83.3	25	83.3
		(88.3)				(93.3)				(78.3)				(83.3)		
3	21	70.0	25	83.3	26	86.7	25	83.3	23	76.7	23	76.7	22	73.3	20	66.7
		(76.7)				(85.0)				(76.7)				(70.0)		
4	25	83.3	24	80.0	26	86.7	27	90.0	22	73.3	23	76.7	23	76.7	18	60.0
		(81.7)				(88.3)				(75.0)				(68.3)		

B = Bankrupt
N = Non-bankrupt
* Only 27 bankrupt firms in year 1.

discriminant function coefficients are presented in Table 3.[6] The variables are presented in the order that they entered the discriminant functions.

An examination of Table 3 reveals the instability of the bankruptcy prediction process. The degree of instability in the models is evident when the models of each individual year are compared against each other; *e.g.*, compare the first year GPL model to the second year GPL model. The comparison reveals little stability in either the GPL or HC, models. A ratio that appeared in one year's model often did not appear in succeeding years. No ratio appeared in all four years' HC discriminant models and no ratio appeared in all four years' GPL models either. The instability of the GPL and the historical cost models was further evidenced by the values of the partial *F* ratios and the discriminant function coefficients, which changed markedly from year to year. The significance of the partial *F* ratios at the .05 level can be examined in Table 3. It is evident that most of the partial *F* ratios are not significant at that level.

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[6] This study is consistent with all previous bankruptcy prediction studies in that *linear* MDA was used. The theory of linear MDA assumes the equality of the group covariance matrices but such is usually not the case in practice. Discriminant analysis is fairly robust with regard to violations of the underlying assumptions. Still when the covariance matrices are very dissimilar, *quadratic* MDA should be used.

If linear MDA is used when quadratic MDA is appropriate, the tests for equality of group means are biased. More importantly, the percentages of misclassifications are biased. Eisenbeis and Avery [1972, pp. 37–38] indicate the use of linear MDA, when the dispersion matrices are unequal, tends to cause more classifications into the group with the larger dispersion. Further, their experience indicates that "for given differences in group means the predictive power of the linear rules relative to quadratic rules decreases as the difference between the group dispersions increases" [1972, p. 38].

A test for homogeneity of variance [Kendall and Stuart, 1976] was conducted to test whether the dispersion matrices were equal in this study. The results indicate that the covariance of the ratios of the failed group is significantly different than the covariance of the ratios

TABLE 3

DISCRIMINANT FUNCTIONS DEVELOPED FROM THE STEPWISE TECHNIQUE

Historical Cost				*GPL*			
Year	*Variable*[a]	*Partial F Ratio*[b]	*Std. Discr. Coef.*	*Year*	*Variable*[a]	*Partial F Ratio*[b]	*Std. Discr. Coef.*
1	019	48.54	.233	1	019	50.89	.701
	023	3.85	−.068		023	3.43	−.247
	017	3.64	−4.27		011	4.96	.429
	022	3.46	.101		006	2.00	−.226
	020	1.69	−.126		031	1.32	−.149
	006	1.55	−.131		028	1.03	−.133
	031	1.59	−.101				
	024	1.19	.308	2	017	26.09	.186
	026	3.31	−.293		030	5.95	−.045
					022	2.09	.150
2	017	29.35	−.955		032	5.38	−.089
	015	5.02	−.604		021	1.57	.065
	003	5.04	.411		024	1.49	−.194
	012	3.71	−.432		026	3.74	.258
	021	1.39	−.339		028	4.46	−.100
					025	1.35	.035
3	018	19.79	−.714		011	2.10	−.073
	011	4.07	.602				
	031	3.68	.364	3	018	21.82	.618
	006	5.37	−.313		031	5.23	−.217
	023	1.53	−.084		006	3.94	.284
	005	1.45	−.148		014	2.10	−.105
	021	1.09	.237		019	1.56	.026
	019	2.29	−.544		021	2.39	−.182
	009	2.62	−.399				
				4	018	13.24	.048
4	018	10.65	.469		008	2.60	.083
	030	3.13	−.175		031	2.65	−.021
	012	2.57	−.128		019	1.56	.026
	002	1.12	.141		005	1.89	.011
	028	1.11	.111		028	2.06	−.007
	025	1.63	.118		021	3.29	.013
	006	1.50	.178		012	2.63	.094
	019	1.77	.260				
	024	1.00	−.046				

[a] Variables are presented in the order they enter the function. In all cases the criterion F ratio to enter or be removed was 1.0.

[b] For year 1, F (.05; 1,55) ≃ 4.02. For years 2, 3, and 4, F(.05; 1,58) ≃ 4.01.

Two explanations could be advanced for the instability in the functions. First, it is probably true that the determination of the most important explanatory variables is dependent upon the number of years prior to bankruptcy. After all, we should not expect the same ratios to be useful one year prior to bankruptcy as are useful two years prior. Second, the instability may be caused by the corre-

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of the nonfailed groups for both HC and GPL ratios. The SAS Discriminant Package allows the user to test for unequal dispersion matrices and base the discriminant equations on the within groups matrix when the matrices are unequal. That option was applied to the ratios of approach four. The results indicate: (1) functions based on the within groups matrices correctly classified more non-bankrupt firms and fewer bankrupt firms for both HC and GPL, (2) the overall percent correctly classified was only slightly different than presented in Table 2, and (3) comparisons of HC versus GPL were not affected.

lation between the variables. Many of the 32 ratios are correlated with each other. When multicollinearity exists, the functions may be highly sensitive to the sample data. The addition or deletion of a few observations may produce shifts in the variables contained in the functions and the coefficients of those variables. Table 3 should be interpreted accordingly.

The *overall* percentages of correct classification in Table 2 reveal that HC predictions were better in the first and third years prior to bankruptcy (89.5 percent to 87.7 percent in the first year and 83.3 percent to 76.7 percent in the third year). GPL predictions were better in the second year prior to bankruptcy (88.3 percent to 83.3 percent). The overall percentages of correct classifications of the GPL and HC models were equal (81.7 percent) in the fourth year prior to bankruptcy. In general, the overall percentages of firms correctly classified were so similar that it is difficult to draw any meaningful conclusions except that the two models perform more or less equally well.[7]

It is also useful to analyze *which* firms were correctly classified by the models. The analysis is especially useful when the percentages of firms correctly classified are similar. This study assumed that the costs of misclassifying a bankrupt firm were greater than the costs of misclassifying a nonbankrupt firm. If an investor misclassified a non-bankrupt firm, he would not make the investment. The cost of misclassification would be the opportunity loss resulting from *not* making the investment. If an investor misclassified a bankrupt firm, he *would* make the investment. The cost of misclassification likely would be the loss of the original investment incurred when the firm defaulted. For the foregoing reasons, if two prediction models classified a similar percentage of firms correctly but one model classified more *bankrupt* firms correctly, that model was considered superior in this study.[8]

In approach one, the HC models predicted more bankrupt firms correctly in the first (23 to 22), third (24 to 21), and fourth years (26 to 25) prior to bankruptcy. The GPL model predicted more bankrupt firms correctly in the second year prior to bankruptcy (27 to 24).

Approach one is useful because it indicates the predictive accuracy of the "best" combination of financial ratios that can be developed for each year prior to bankruptcy. No clear advantage existed for either GPL or HC prediction *models* when Tables 2 and 3 are examined. Since the GPL and HC models were not the same in any year, conclusions about GPL and HC *information* were not possible from approach one.

Approach Two Results

The classifications of the bankrupt and non-bankrupt firms from the functions developed in approach two are presented in Table 2. The overall percentages of correct classifications were higher (for both GPL and HC predictions) than the corresponding percentages in approach one. The results indicate that better predictions are possible when all the ratios are forced to become part of the discriminant functions than when the stepwise technique is used. However, the gains in predictive ability probably are

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[7] It is generally assumed that the cost of providing GPL financial information is greater than the cost of providing conventional historical cost data. When GPL and historical cost data predict bankruptcy equally well, historical cost data must be favored.

[8] Most computer discriminant packages allow a more formal consideration of the costs of misclassification. Few of the previous bankruptcy studies have utilized that aspect of discriminant analysis; probably because the costs are difficult to quantify. Actually, a researcher would not be required to develop an exact quantification if the relative costs of Type I and Type II errors could be formed [Eisenbeis and Avery, 1972, p. 13].

TABLE 4

UNIVARIATE F RATIOS IN THE FIRST YEAR PRIOR TO BANKRUPTCY[a]

Ratio No.	*Ratio Description*	*Hist. Cost F Ratio*	*GPL F Ratio*
001	Current ratio	21.60	22.35
002	Cash/current liabilities	16.85	16.85
004	Quick assets/current liabilities	19.33	19.42
007	Working capital/total assets	17.36	16.94
009	Cash flow/total assets	11.31	13.78
011	Cash flow/total liabilities	23.88	21.51
013	Net income/total assets	11.54	14.01
014	Net income/total liabilities	21.42	19.05
015	Current liabilities/total assets	21.70	21.48
017	Total liabilities/total assets	40.36	38.78
018	Tot. liab.+pref. stock/total assets	39.30	37.81
019	Net worth/total liabilities	48.45	50.89
021	Net worth/fixed assets	24.61	20.72

[a] All F ratio values are given for 1 and 55 degrees of freedom.

not great enough to offset the loss of efficiency resulting from the use of extra ratios. Thus, ratios that have very little additional information value can be eliminated with only a small decline in predictive ability. Comparisons of the *overall* percentages of correct classifications indicate that the GPL model was more accurate than the HC model in three of the four years.

Approach Three Results

In Table 4, the 13 ratios with the largest univariate *F* ratio values are shown to have been the same, whether the ratios were computed from GPL or historical cost financial statements. That set of 13 ratios was selected for the discriminant functions developed for each year prior to bankruptcy.

A GPL and HC discriminant function was developed for each of the four years prior to bankruptcy using the same set of 13 ratios. The classifications of the 60 sample firms by the GPL and HC discriminant functions are presented in Table 2. The *overall* percentages of correct classifications indicate that the HC model predicted more accurately in three of the four years than did the GPL model. The slight superiority of the HC model in approach three was exactly opposite the results of the models of approach two.

Any conclusion from the results of approach three is weakened by two factors. First, the model developed in approach three performed well, but was not the best that could be developed for any year. The poorer performance of the model was the result of choosing the ratios on the basis of their *individual* information value in the first year prior to bankruptcy.

Second, in approach three the differences between the predictive accuracy of the HC and the GPL model was very small in every year. The univariate *F* ratios provided an explanation of why the difference between the performance of HC and GPL models was not great. Discriminant analysis is based upon a difference between the bankrupt and nonbankrupt groups with respect to a set of variable (ratios in this case). The univariate *F* ratios indicate that a difference

TABLE 5

RESULTS OF HISTORICAL COST AND GPL REGRESSIONS PERFORMED TO SELECT A SET OF VARIABLES IN APPROACH FOUR

Order of Variables	*Ratio Description*	*Change in R^2*	*Beta*	*F Ratio*
	Historical Cost Regression			
019*	Net worth/total liab.	.226	.024	.031
020*	Net worth/long-term liab.	.027	−.107	2.235
018*	To.li.+pr.st./total assets	.030	−.538	13.611
030*	Cash interval	.020	.200	11.379
006*	Cur. assets/total assets	.025	−.260	7.438
Year		.016	−.183	10.696
023*	Sales/cash	.017	−.088	2.575
011*	Cash flow/total liab.	.005	.456	9.527
009	Cash flow/total assets	.022	−.410	7.349
032	Sales/net worth	.005	−.100	2.895
010	Cash flow/net worth	.003	−.069	1.252
005	Quick assets/total assets	.002	.059	.943
029	Sales/total assets	.002	.201	1.972
027	Sales/current assets	.003	−.170	1.280
031	Defensive interval	.002	−.045	.776

Degrees of freedom: 15, 221
$F(.05, 15, 221) \approx 1.67$
$R^2 = .412$

Adjusted $R^2 = .375$
Standard error = .397
Overall F ratio = 10.33

* Indicates the variables chosen on the basis of the established criteria. Four other variables were added to the seven variables highlighted. The discriminant functions used that set of eleven variables for each year's bankruptcy prediction.

between the groups did exist in this study, *amount* of the difference remained relatively stable whether the ratio was computed from HC or GPL statements. For example, when the value of the current liabilities to total assets ratio (ratio 015) was computed from the HC statements for the first year, the mean value for the bankrupt group was .744; and for the non-bankrupt groups it was .281. The difference is .744 − .381 = .463. When the same ratio was computed from the GPL financial statements, the mean value for the bankrupt group was .667; and for the non-bankrupt group it was .254. The difference is .667 − .254 = .413. Other ratios exhibited the same pattern. The values of the ratios were different after GPL adjustments, but the difference between the ratios of the bankrupt and non-bankrupt groups tended to remain relatively stable.

Approach Four Results

In approach four, stepwise multiple linear regression analysis was used to select a set of ratios. The selected variables were then used in discriminant functions to predict bankruptcy each year. The order in which the ratios entered the GPL and HC regression equations, the change in R^2, the *beta* coefficients, and F ratios of each individual variable are presented in Table 5. The seven variables initially selected upon examination of the regression results are highlighted in the table.

The first seven variables to enter the equations were the same for the GPL and the HC regression analyses, although

TABLE 5—(*Continued*)

Order of Variables	*Ratio Description*	*Change in R^2*	*Beta*	*F Ratio*
	GPL Regression			
019*	Net worth/total liab.	.253	.084	.308
020*	Net worth/long-term liab.	.034	−.150	4.089
023*	Sales/cash	.018	−.048	.581
018*	To.li.+pr.st./total assets	.015	−.481	11.052
030*	Cash interval	.014	.553	5.488
006*	Cur. assets/total assets	.008	−.336	8.459
Year		.007	−.134	5.352
011*	Cash flow/total liab.	.005	.429	8.248
013	Net income/total assets	.014	−.495	8.375
004	Quick assets/current liab.	.006	.191	3.351
008	Cash flow/sales	.003	.427	3.759
002	Cash/current liab.	.005	−.437	6.018
029	Sales/total assets	.006	.245	2.375
025	Sales/inventory	.010	−.118	2.044
003	Cash/total assets	.004	.230	1.799
001	Current ratio	.002	.142	1.050
027	Sales/current assets	.001	−.152	.722
031	Defensive interval	.001	−.042	.651

Degrees of freedom: 18, 218
$F(.05, 18, 218) \approx 1.61$
$R^2 = .414$

Adjusted $R^2 = .369$
Standard error = .399
Overall F ratio ≐ 8.56

they did not enter in the same order. Those seven variables were chosen on the basis of the selection criteria established. Ratio 019 (net worth to total liabilities) was included since it was the first variable to enter both equations and was responsible for the largest change in R^2, even though its coefficient was not large and its F ratio not statistically significant. Four ratios were added to the seven originally chosen from the regression equations. Ratios 013 (net income to total assets) and 030 (cash interval) were added because they had been used in previous studies. Ratios 007 (working capital to total assets) and 029 (sales to total assets) were added to achieve a balance between the types of ratios used in the composite model developed in approach four.

The 11 variables selected were used in discriminant functions to predict bankruptcy or non-bankruptcy. The classifications of the sample firms with the historical cost and GPL discriminant models from approach four are presented in Table 2.

In Table 2, comparisons of the overall percentages of correct classifications achieved with GPL and HC ratios yielded mixed results. GPL was better able to predict whether bankruptcy would occur in the first and fourth years. HC predicted better in the third year. The second year prior to bankruptcy, the GPL and HC ratios achieved the same overall percentage of correct classifications. The overall percentages were very similar in all cases.

SUMMARY AND CONCLUSIONS

Both GPL and HC ratios exhibited the ability to predict bankruptcy. In spite of the sizable differences in magnitude that existed between GPL and HC financial statements, little difference was found in the bankruptcy predictions. Usually the results were mixed; GPL was slightly better in some years but slightly worse in others. GPL data were shown to be consistently neither more nor less accurate than HC data for predictions of bankruptcy.

Many *a priori* arguments have been advanced to imply that GPL financial statements are (or should be) more useful. Yet in this study, GPL financial ratios were not found to be more accurate in predicting bankruptcy. The general belief here is that inconvenience and costs would be incurred if the accounting profession required the provision of GPL financial statements. GPL data must be proven to be *more* useful—not equally useful—to be justified. GPL and HC financial statements were equally useful for predicting bsnkruptcy for the sample of firms used in this study. GPL financial statements could not be recommended on the basis of this study if the criterion of usefulness is the ability of financial statements to predict bankruptcy.

In spite of the findings of this study, GPL financial statements may yet be shown to be useful for the following reasons:

1. The rate of inflation during the time period studied was high, but an even higher rate may cause GPL financial statements to be more useful.
2. The sample of firms was rather small by necessity. It is possible (but we feel unlikely) that a larger sample of firms would have indicated that GPL is useful.
3. Usefulness was defined as the ability to predict bankruptcy. Before an overall evaluation can be made, other uses of accounting data must be examined such as evaluation of management performance and prediction of future return and/or cash flow.

We would encourage further research to address any deficiencies and areas not examined in this study.

APPENDIX

TABLE 6

BANKRUPT AND NON-BANKRUPT FIRMS SELECTED FOR THE SAMPLE, 1971–1975

Bankrupt Company Name	*Year of Bankruptcy*	*Non-bankrupt Company Name*
Commodore Corp.	1974	Champion Home Building
Bohack Corp.	1974	Albertsons, Inc.
Ancorp National Serv.	1971	Book of the Month Club
Kenton Corp.	1974	Outlet Co., Inc.
Mangel Stores Corp.	1974	Hughes & Hatcher
Horn and Hardart Co.	1973	Telex Corp.
Dynamics Corp. of America	1973	Savin Business Machines
Esgro, Inc.	1973	Allied Stores
W. T. Grant, Inc.	1975	Career Academy
FAS International	1972	Glen-Gerry Corp.
DCA Development	1973	Rockower Brothers
Unishops, Inc.	1974	Franklin Stores
Miller-Wohl, Inc.	1974	Lehigh Press, Inc.
Remco Industries	1972	C. R. Masland & Co.
Goodway, Inc.	1974	Fabri Centers of America

TABLE 6—(*Continued*)

Sequoyah Industries	1974	Eagle Clothes
Coit International	1975	Crowley, Milner Co.
Botany Industries	1972	Clarostat Manufacturing
Giant Stores, Inc.	1973	Londontown Manufacturing
REDM Corp.	1972	Simplex Industries
RAI, Inc.	1972	Gaylords National
Rosenau Brothers	1972	Conrac Corp.
Milo Electronics	1971	Williamhouse-Regen
Technical Tape	1972	Marshall Field Co.
Volume Merchandise	1973	Goldblatt Brothers
Harvard Industries	1973	Thrifty Drug
Arlans Dept. Stores	1974	Tonka Corp.
Interstate Dept. Stores	1974	Arrow Electronic
American Book-Strat	1973	R. G. Barry Corp.
Daylin, Inc.	1975	Szabo Food Service
Average Asset Size=$90.0 million		Average Asset Size=$90.4 million

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Understanding and Acceptance of the Efficient Markets Hypothesis and its Accounting Implications

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ABSTRACT: This survey reports on the levels of understanding and acceptance of the efficient markets hypothesis (EMH) in each of its three forms and on the extent of awareness of the accounting implications of the semi-strong and strong forms of the EMH. Selected accounting-information preparers and users were contacted and a 79 percent analyzable response rate obtained. Generally, low levels of understanding of the EMH and its accounting implications as well as extremely low levels of EMH acceptance were found. A majority of respondents indicated that they thought fundamental analysis was useful in out-performing the market averages over the long-term. Audited financial statements and quarterly reports were thought very useful for this purpose, especially by chartered financial analysts (CFAs). Twice as many CFAs as partners of Big Eight firms thought that accounting-determined risk measures were highly associated with market-determined risk measures. As a group, only accounting academicians thought inside information was useful in outperforming market averages.

THE security-market-based research conducted over the last ten years has provided, in the opinion of some, a way of significantly narrowing the range of current accounting controversies.[1] Beaver [1973] argues that the methods and findings of capital markets research provide an operationally meaningful way of specifying the goals of accounting policymaking bodies and determining optimal accounting treatments [1972, pp. 409, 428]. Anderson and Meyers [1975, p. 31] suggest that these methods can at least be useful in identifying substantive accounting policy choices. A different use of these empirical methods lies in the assessment of the effects of alternative accounting procedures [Gonedes and Dopuch, 1974, p. 50]. While the debate continues over the proper uses of these research methods, their apparently significant implications for accounting-information preparers and users have been widely commented upon.

Accounting-information preparers include corporate accounting officers, pub-

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[1] This view is not unanimously held. The strongly worded exchanges that have appeared in the professional literature reflect the intensity of beliefs on this issue. See, for example, the exchanges between Beaver [1974] and Bierman [1974] and between Gonedes and Dopuch [1974a] and Sterling and Harrison [1974].

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lic accountants, and—in a long-term sense—accounting academicians. Beaver, Kettler, Scholes [1970] and Thompson [1976] (who accept weak and semi-strong market efficiency) indicate that accounting-information preparers would benefit if they paid attention to the correlation of accounting measures of risk and profitability with corresponding market measures. Additionally, they note that more attention should be paid to a firm's non-systematic risk characteristics. Anderson [1977] and Beaver [1973] have discussed the impact of market efficiency on considerations of legal liability of auditors. Van Horne [1977] has portrayed the potentially extensive impact on businessmen's capital budgeting, working capital management, financing, and dividend policies that acceptance of portfolio theory and capital markets efficiency would have.

Among accounting-information users, Black [1976] has examined and contrasted some of the implications of acceptance of the efficient markets hypothesis (EMH) and its accounting and investment management implications. He focused on individual investors, pension fund trustees, university endowment fund committees, and trustees dealing with income beneficiaries and remaindermen. The shift in financial analysts' activities that would result from acceptance of the research findings related to the EMH has been extensively treated in the literature of financial analysis and portfolio construction [Institute of Chartered Financial Analysts, 1975]. Readers of these articles may understand the perspectives of the writers but may not accept their conclusions. Acceptance may depend, in part, on the readers' own attitudes to and perceptions of securities market—particularly New York Stock Exchange (NYSE)—efficiency.

How convincing has the evidence presented by EMH researchers been in modifying accounting-information preparer and user attitudes and perceptions? How large is the group of accounting-information preparers and users who (1) are aware of the EMH, (2) understand the accounting implications of the EMH, and (3) accept the EMH researchers' findings with respect to the existence of weak, semi-strong, and strong form market efficiency on the NYSE? Obtaining answers to these questions was the purpose of a study concluded in 1976 and reported here.

METHOD

The questions discussed in the preceding paragraph suggest the potential usefulness of information about individuals' knowledge and opinions. Sometimes an accessible record of actions reflecting individual attitudes is obtainable [Foster, 1975]. At other times, records of group actions are satisfactory for the research purpose [Jensen, 1968]. Reliance on such publicly available records of actions avoids certain problems such as non-response bias and questionable validity [Kerlinger, 1973, p. 423]. Yet, as Foster [1975] shows, such records have limited usefulness, and an alternative data collection method must be found if the problem is not to be laid aside. The number and location of data sources as well as the nature of the data and economic constraints are relevant in determining the data collection system.

In this study, data were collected by use of a mailed questionnaire after it had been determined that the proper application of survey response improvement techniques could overcome the problems associated with non-response bias. Three subgroups were chosen to represent accounting-information preparers: (1) controllers of *Fortune* 500 corporations, (2) academicians who are members of the

American Accounting Association (AAA), and (3) partners of the Big Eight CPA firms. Chartered financial analysts, the fourth group surveyed, were chosen to represent accounting-information users. A random sample of 200 eligible subjects was drawn from the membership directory of the American Institute of CPAs (group 3), of the AAA (group 2), and of the Institute of Chartered Financial Analysts (group 4).[2] A random sample of two hundred *Fortune* 500 corporations was selected, and the controller of each firm was subsequently identified.

Questionnaire Construction

A 23-item questionnaire (see Appendix) was developed which was in closed-form, dichotomous format. This permitted classification of respondents into one of 21 categories or profile classifications. The questions are presented in the Appendix. In addition, information about age and education was requested. By answering the 23 items, each respondent provided information about his understanding of the EMH; his awareness of the accounting implications of the semi-strong and strong forms; and his acceptance of the EMH research findings about market efficiency in the weak, semi-strong, and strong senses.

Neither the questionnaire nor the related correspondence used phrases such as "efficient markets hypothesis" or "capital asset pricing model." Use of concepts without labels was stressed to avoid halo effects (tendency to respond to a question or phrase in terms of a general impression of favor or disfavor). To avoid the response set of acceptability, no names of prominent contributors to efficient markets research or traditional valuation approaches were used. These and other response sets considered in the development of the data collection instrument are discussed in Guilford [1954, pp. 451–56] and Bronfenbrenner and Ricciuti [1960, pp. 776–77].

Validity and Reliability

Validity refers to "the extent to which an instrument and the rules for its use in fact measure what they purport to measure" [Cannell and Kahn, 1968, p. 532]. Several types of validity were thought to be important in this study—content validity, construct validity, and criterion-related (or empirical) validity.

Content validity is judgmental in nature and refers to the inclusion of an adequately representative number of "important bits of knowledge" in the areas surveyed [Lyman, 1971, p. 22]. The first drafts of the questionnaire were prepared after a general review of the EMH literature and discussions with a staff member of the Institute of Chartered Financial Analysts. Subsequently, a number of changes were made to simplify language and clarify ambiguities. These changes were based on pretesting involving about 20 graduate and 15 undergraduate students in accounting and finance. The last set of revisions were prepared at the suggestion of a finance professor. The scoring key was finalized. At this point, three other finance professors, all of whom understood and accepted the research findings relating to the EMH and were aware of its accounting implications, reviewed the representativeness of the questions. These procedures were designed to strengthen content validity and reduce the contaminating influence of certain response sets.

Construct validity focuses on "the property being measured" [Kerlinger, 1973, p. 461]. The emphasis is on predicting results which should be obtained if the test is valid. While many factors account for differences in test performance, two were thought to be particularly important: (1) the internal consistency of survey participant responses and (2) random or haphazard completion of the questionnaire by inadequately motivated respondents.

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[2] The cooperation of the staff of the Institute of Chartered Financial Analysts in granting permission to use the CFA mailing list and their helpful suggestions about questionnaire design are gratefully acknowledged.

To test for lack of internal consistency, several questions were selected to see if a respondent was indicating his acceptance of the EMH in its semi-strong form while simultaneously affirming his belief that financial statements and fundamental analysis were useful in consistently detecting over- or under-valued securities. This pattern was one way used to estimate the number of respondents providing internally inconsistent responses and was thought appropriate because it was so basic to the issues under examination. Only ten respondents, less than 2 percent, fit the internally inconsistent pattern.

Examination of returned questionnaires for patterns of incomplete responses is a way of evaluating respondent motivation. Of the 678 responses received, 65 were non-analyzable. No dominant pattern of causes appeared to be evident, however. Of the 613 analyzable responses, 20 were from participants who failed to note their age or highest academic degree earned. Missing answers were limited to less than 1 percent of the analyzable responses for each of the 23 questions asked, except for question 23, which dealt with the usefulness of inside information. In that case there were nine (1.5 percent) missing answers.

Criterion-related (or empirical) validity is examined when obtained scores are compared "with . . . external variables or criteria . . . believed to measure the attribute under study" [Kerlinger, 1973, p. 459]. In respect to knowledge and acceptance of the EMH and its accounting implications, existing questionnaires with established records of validity were unavailable. Guilford [1954, pp. 399, 408] comments on use of a control group whose knowledge and attitudes can be separately determined as a substitute for the nonexistent independent and objective measures.

Using the scoring key discussed earlier, the researcher asked five faculty and ten graduate students in finance as well as ten accounting professors and ten CFAs (all in the Atlanta, Georgia, area) to complete the questionnaire in a pilot study. Subsequent individual interviews identified those who understood and accepted the EMH research findings and were aware of the related accounting implications. These individuals (ten from the finance department and two CFAs) became the control or reference group. Examination of their response patterns showed that, using the scoring key, ten would have been correctly classified in response category 21 (to be explained later).

Like validity, there are several types of reliability. Specification of critical sources of error variance is important in deciding how to check questionnaire reliability [Kerlinger, 1973, pp. 447–49]. In this study, measures of internal consistency were thought appropriate. A widely used procedure for checking internal consistency is one of the Kuder-Richardson formulas. In this case, where all the items had approximately the same degree of difficulty, Guilford and Fruchter [1973, pp. 417–19] suggest Kuder-Richardson formula 21 which produced an internal consistency reliability estimate of .87.

Response Rates and Non-Response Bias

The non-response bias created by low return rates in mail questionnaire research can seriously impair the validity of survey based generalizations. Both Kerlinger [1973, p. 414] and Parten [1950, p. 400] discuss the effects of nonresponse bias. Careful application of survey response improvement techniques was designed to reduce nonrespondents to the lowest level attainable within existing financial and temporal constraints [Dillman, 1972; Donald, 1960; Robin, 1965; and Williams and Wechsler, 1970].

An advance letter was used to obtain greater subject involvement and to secure a more sympathetic reception for the questionnaire [Bachrack and Scoble, 1967; Ford, 1967; Parsons and Medford, 1972]. The advance letter, questionnaire cover letter, and accompanying envelopes were personalized, and first-class postage was used on all correspondence [Dillman, 1972; Dillman and Frey, 1974; Matteson, 1974; Roeher, 1963]. Subjects were provided with a reasonably complete description of the research project and a statement of the expected benefits [Clausen and Ford, 1947; Dillman, 1972]. Subjects were offered a copy of a preliminary analysis of the survey data; about 71 percent of the respondents indicated they wished to receive copies of this data analysis.

The questionnaire cover letter asked each participant who decided not to complete the survey to return it in blank, noting the reason for non-completion. As indicated by Moser [1958, p. 129], addressees lying outside the survey population "should be subtracted from the sample size before calculating the nonresponse rate." Of the 65 non-analyzable responses that were returned, 29 were subtracted from the original 800 sample size. These included unavailable participants (moved without leaving a forwarding address, deceased, *etc.*). The adjusted sample size was 771.

Follow-up procedures consisted of two postcards [Hackler and Bourgette, 1973, p. 278]. Messages on the follow-up cards were adapted from Nichols and Meyer [1966, p. 306]. The first follow-up card was sent three days after the questionnaire had been mailed [Nichols and Meyer, 1966, p. 306; Clausen and Ford, 1947, p. 503]. The second postcard was sent 13 days after the questionnaire had been mailed. Twenty-three days after the questionnaire had been mailed, a duplicate questionnaire with cover letter was sent to all non-respondents. The altruistic tone of the advance letter and the questionnaire cover letter was modified gradually in the follow-up correspondence [Robin, 1965, p. 27; Williams and Wechsler, 1970, p. 533].

This combination of survey response improvement techniques produced an overall response rate of 84 percent and an overall analyzable response rate of 79 percent. Table 1 shows the total and analyzable response rates by occupational groups.

TABLE 1

RESPONSE RATES BY GROUPS

Groups	*Response Rates*	
	Total	*Analyzable*
Fortune 500 Controllers	77.8%	73.7%
Accounting Academicians	89.1	83.9
Partners of Big Eight Firms	86.8	79.9
Chartered Financial Analysts	83.1	80.5

Kerlinger [1973, p. 414] noted that an 80 percent response rate generally may be considered satisfactory in mail survey research. Oppenheim [1966, p. 34] suggested that the existence of non-response bias may be detected by assuming that late respondents are similar to nonrespondents and then testing for differences between early and late respondents.

In this connection a regression analysis was performed using response time as the independent variable and number of conforming answers as the dependent variable. The object was to see if early respondents had a significantly different number of conforming answers than late respondents. The resulting coefficient did not differ significantly from zero (*alpha* =.05), indicating that early and late respondents did not differ significantly in respect to the number of conforming answers. Even though non-response was rather small, this finding would strengthen the support for the existence of no non-response bias.

Areas Examined

The information available for investors in their security selection activity can be viewed as

$$\phi^w \subset \phi^p \subset \phi^v \qquad (1)$$

where ϕ^w represents the sequence of past security price, volume, and returns information, ϕ^p represents all publicly available information, and ϕ^v represents everything that is knowable and relevant for determining the price of the security under consideration.[3] Each respondent was asked to provide information about the expected returns, $E(\tilde{r})$, that he thought could be obtained fairly consistently from each of the information sets in Equation (1). The difference between actual returns on security j and the expected returns conditional on the information set used can be portrayed as:

$$x_{j,t+1} = r_{j,t+1} - E(\tilde{r}_{j,t+1}|\phi_t^w)$$
$$y_{j,t+1} = r_{j,t+1} - E(\tilde{r}_{j,t+1}|\phi_t^p)$$
$$z_{j,t+1} = r_{j,t+1} - E(\tilde{r}_{j,t+1}|\phi_t^v)$$

A large body of evidence indicates the NYSE is efficient in respect to ϕ^w and ϕ^p but not in respect to ϕ^v.[4] An individual who accepted these findings would conclude that

$$E(\tilde{x}_{j,t+1}|\phi_t^w) = 0 \qquad (2)$$
$$E(\tilde{y}_{j,t+1}|\phi_t^p) = 0 \qquad (3)$$
$$E(\tilde{z}_{j,t+1}|\phi_t^v) > 0 \qquad (4)$$

That is, an individual who accepted this evidence would believe that excess returns could not be consistently earned using only the sequence of past security price, volume, and returns information (ϕ^w) or all publicly available information (ϕ^p). He would believe that it is possible to earn excess returns in the long run by having access to nonpublic as well as public information. Both the scoring key and the reference group responses were based on the relationships stated in Equations (2), (3), and (4).

Eight areas were measured, and respondent scores were developed in each of these areas sequentially. The following areas were measured:

area 1 (A1): understanding of the EMH in its weak form
area 2 (A2): understanding of the EMH in its semi-strong form
area 3 (A3): understanding of the EMH in its strong form
area 4 (A4): understanding of the accounting implications of the EMH in its semi-strong form
area 5 (A5): understanding of the accounting implications of the EMH in its strong form
area 6 (A6): acceptance of the EMH in its weak form
area 7 (A7): acceptance of the EMH in its semi-strong form
area 8 (A8): acceptance of the EMH in its strong form

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[3] The classification of the information continuum into weak, semi-strong, and strong portions as well as the discussion about excess returns are adapted from Fama [1970].

[4] This evidence is summarized in Dyckman, Downes, and Magee [1975], Fama [1970], and Lorie and Hamilton [1973]. Also see Finnerty [1976] for additional references.

TABLE 2

ENUMERATION AND DESCRIPTION OF RESPONDENT PROFILE CLASSIFICATIONS

Respondent understands the efficient markets hypothesis in its ________ form:			*Respondent is aware of the accounting implications of the ________ form:*		*Respondent accepts the results of efficient markets research on the ________ form:**		
(A1)	*(A2)*	*(A3)*	*(A4)*	*(A5)*	*(A6)*	*(A7)*	*(A8)*
weak	*semi-strong*	*strong*	*semi-strong*	*strong*	*weak*	*semi-strong*	*strong*
1. no	—	—	—	—	—	—	—
2. yes	no	—	—	—	no	—	—
3. yes	no	—	—	—	yes	—	—
4. yes	yes	no	no	—	no	—	—
5. yes	yes	no	no	—	yes	no	—
6. yes	yes	no	no	—	yes	yes	—
7. yes	yes	no	yes	—	no	—	—
8. yes	yes	no	yes	—	yes	no	—
9. yes	yes	no	yes	—	yes	yes	—
10. yes	yes	yes	no	—	no	—	—
11. yes	yes	yes	no	—	yes	no	—
12. yes	yes	yes	no	—	yes	yes	no
13. yes	yes	yes	no	—	yes	yes	yes
14. yes	yes	yes	yes	no	no	—	—
15. yes	yes	yes	yes	no	yes	no	—
16. yes	yes	yes	yes	no	yes	yes	no
17. yes	yes	yes	yes	no	yes	yes	yes
18. yes	yes	yes	yes	yes	no	—	—
19. yes	yes	yes	yes	yes	yes	no	—
20. yes	yes	yes	yes	yes	yes	yes	no
21. yes	yes	yes	yes	yes	yes	yes	yes

* As summarized in the relationships numbered (2) through (4) discussed in text.

Because of the relationships illustrated in Equation (1), a respondent who indicated he did not understand or accept the EMH in its weak form could not understand or accept the EMH in its semi-strong or strong forms. Such a respondent might believe that it is possible to earn excess returns using only ϕ^w. This conflicts with the research findings summarized in Equation (2). Furthermore, because ϕ^w is public information, he would also have to conclude that it is possible to earn excess returns with ϕ^p. Thus answers in certain scored areas imply answers in other scored areas. As a result, the implications of Equations (1), (2), (3), and (4) limit the number of possible combinations of the eight areas to the 21 listed and explained in Table 2. Each column in Table 2 represents one of the eight scored areas and each row, one of the 21 possible profile classifications.

Measurement of Results

Measurement of results was "concerned with distinguishing the adequate from the inadequate" [Cronbach, 1976, p. 201] among the analyzable responses. Each of the 23 answers on each questionnaire was scored as either conforming ("yes" in Table 2 or Figure 1) or non-conforming ("no" in Table 2 or Figure 1) to the scoring key, which was also the reference group pattern. For each of the eight areas examined, Table 3 lists the non-conforming responses by question. Blanks in the table indicate that the response to the particular question was not relevant to the area being measured.

TABLE 3

NON-CONFORMING RESPONSES BY SCORED AREA

Scored area / Question number	*A1*	*A2*	*A3*	*A4*	*A5*	*A6*	*A7*	*A8*
1.	o	o				y/o	y/o	
2.		o		y/o			y/o	
3.		o		y			y/o	
4.		o		y			y/o	
5.		o		y				
6.	o			y/o		y/o	y/o	
7.		o		n/o				
8.		o					n/o	
9.				n/o				
10.		o					n/o	
11.		o		n/o			n/o	
12.		o		n/o			n/o	
13.	o					y/o		
14.				y/o			y/o	
15.			o		n/o			n/o
16.								
17.			o		n/o			n/o
18.	o					y/o		
19.		o		y/o			y/o	
20.		o		y/o			y/o	
21.		o		y/o			y/o	
22.		o					y/o	
23.			o		n/o			n/o

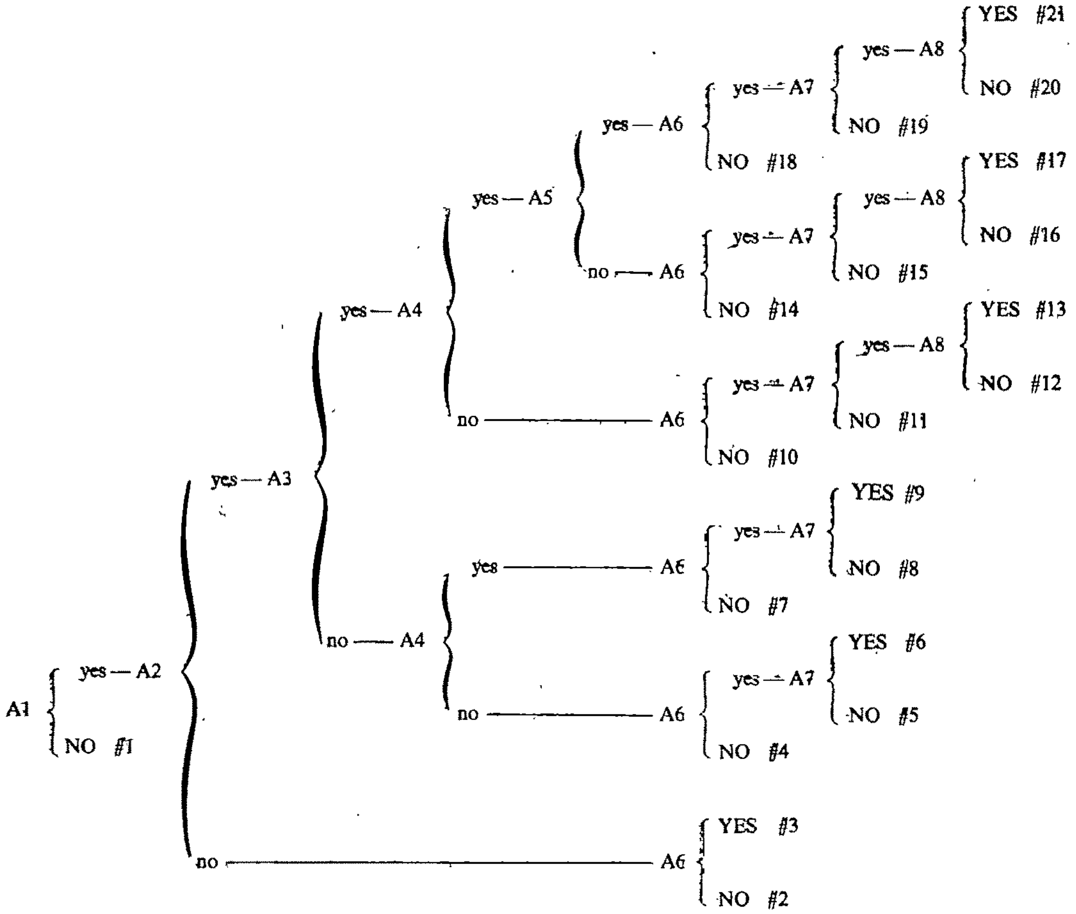
Note: Respondents were asked to reply to each question listed in the appendix yes (y), no (n), or other (o).

Because understanding is a necessary condition for intellectual acceptance of the EMH, the criteria listed for areas 6, 7, and 8 of Table 3 are more demanding than the criteria listed for areas 1, 2, and 3. Similarly, because of the various relationships summarized in Equations (1) through (4), A3′⇒A2′⇒A1′; A5′⇒A4′; and A8′⇒A7′⇒A6′ where (′) indicates a conforming response for the area and (⇒) is read "implies." Also A6′⇒A1′; A7′⇒A2′; A8′⇒A3′; A4′⇒A2′; and A5′⇒A3′. Accepting these conditional relationships, the 21 feasible combinations of the eight scored areas presented in Table 2 can be diagramed as shown in Figure 1. Each of the profile categories listed in Table 2 is shown as a branch-end and labelled #1, #2, ···, #21. Each of the eight scored areas is shown as a fork in the body of the diagram.

Based on the percentage of correct answers given in each area examined, respondents were classified into one of the 21 available profile categories. Selection of an appropriate percentage was complicated by the previously discussed absence of commonly accepted benchmarks. Does a respondent demonstrate adequate knowledge or a conforming opinion when he answers more than three-fourths of the questions in a particular area the same way as the reference group (75 percent cutoff)? More than half the questions (50 percent cutoff)? More than the norm or average of the respondent group as a whole? The choice of cutoff point is subjective. Use of the norm, or overall group average, made little sense, since half the respondents would then be classified as conforming for each of the areas surveyed. Instead

FIGURE 1

DIAGRAM OF RESPONDENT PROFILES AND SCORED AREAS



of the norm, a 25 percent cutoff was used in addition to 75 percent and 50 percent cutoffs.

Examination of survey results shows that even this extremely low cutoff (25 percent) was well above the group average. Besides permitting readers to examine the results using the particular cutoff point which they think is most appropriate, use of these three widely disparate cutoff points shows the sensitivity of results to changes in the way "adequate" is defined. Referring to Figure 1, each respondent who gave more than the specified percentage of non-conforming responses in areas 1 through 8 (A1–A8) was classified onto a "no" branch for that scored area. All other respondents were classified onto a branch labelled "yes." This process continued until all respondents had been categorized into one of the 21 available profiles. Tests for understanding or acceptance in areas A1 through A8 were made operational in this manner.

Use of the binomial test permitted assessment of the chance of achieving a passing score with random guessing.

With respect to understanding of the EMH, the probability of achieving a passing score with random guessing using the 75 percent cutoff was less than 1 percent. Using the 50 percent cutoff, the probability was less than 4 percent. If a respondent only had to get 25 percent of the questions right, his probability of achieving a passing score was 70 percent if he used random guessing. A Kolmogorov-Smirnov test was used to compare actual response patterns with the theoretical distribution of answers that would result from random guessing. The purpose of the test was to estimate the probability that actual responses received came from a population that used random guessing to complete the questionnaire. The results showed that there was less than a 1 percent probability that this had occurred.

SURVEY RESULTS AND IMPLICATIONS

Since both profile classifications and occupations are nominal measures, a chi-square test was used to see if the proportions of respondents in the profile classifications were the same for all occupations.[5] According to Guilford and Fruchter [1973, p. 208] and Cochran [1954] the data in a chi-square test should be so arranged that less than 20 percent of the cells have an expected frequency of less than five and no cell has an expected frequency of less than one. Accordingly, the three profiles (#3, #17, #20) into which no respondents were classified, were eliminated from the analysis. In addition, less than 4 percent of the analyzable responses were reclassified to meet the minimum cell frequency count requirements. With $alpha = .05$, $N = 613$, $df = 33$, the chi-square was calculated to be 96.6. In this case the null hypothesis of no association between occupation and profile classification could be rejected since $p < .001$.

Because the variables are categorical and discrete and because no assumptions are made about the shape of the population distribution, the contingency coefficient, C, was used to measure the extent of the association between occupations and profile classifications. The result ($C = .37$) indicated only a moderate degree of association. Testing the null hypothesis of zero correlation between occupations and profile classifications was accomplished using the chi-square statistic from which C was derived [Siegel, 1956, p. 199]. Again, setting $alpha = .05$, the null hypothesis may be rejected.[6]

Understanding of the EMH

Table 4 presents a summary of understanding of the EMH by respondents in each of the occupational groups for each of the three cutoffs. Column 1 indicates the percentage of respondents who do not understand the EMH in any of its forms. *Fortune* 500 controllers and Big Eight partners showed the greatest lack of understanding of the EMH. Using the 75 percent cutoff, almost two-thirds of the controllers and Big Eight partners did not understand the EMH in any of its forms. This compares with half of the responding academicians. Only 35 percent of the responding CFAs were classified in column 1. Easier cutoffs result in fewer respondents classified in column 1.

Inspection of column 2 in Table 4 indicates that almost all respondents who

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[5] The problems associated with the use of correlation or regression—even with dummy variables—are discussed by Lewellen *et al.* [1977, pp. 300–301] as they pertain to a study of this type.

[6] Separate analysis showed that, setting $alpha = .05$, there was no significant association between age groups and profile classifications. An apparent association between educational level and profile classifications disappeared when controlled for occupation [Nie *et al.*, 1975, p. 220]. This apparent association was explained by the high concentration of doctorates among academicians.

TABLE 4

RESPONDENT UNDERSTANDING OF THE EMH BY OCCUPATIONAL GROUPS

Understood EMH in..	*(1)* *none of its forms*	*(2)* *weak form only*	*(3)* *weak and semi-strong forms*	*(4)* *weak, semi-strong and strong forms*
Fortune 500 Controllers				
25% cutoff	7%	0%	21%	72%
50% cutoff	26	0	15	59
75% cutoff	62	0	13	25
Accounting Academicians				
25% cutoff	11%	0%	5%	84%
50% cutoff	23	2	4	71
75% cutoff	50	0	12	38
Partners of Big Eight Firms				
25% cutoff	16%	1%	15%	68%
50% cutoff	39	0	10	51
75% cutoff	61	1	9	29
Chartered Financial Analysts				
25% cutoff	2%	1%	9%	88%
50% cutoff	10	2	8	80
75% cutoff	35	1	20	44

understood the weak form of the EMH also understood the semi-strong form. In no case were more than 2 percent of the respondents in any occupational group classified as understanding only the weak form of the EMH. Column 3 shows the percentage of respondents who understood the weak and semi-strong forms but failed to understand the strong form of the EMH.

Finally, column 4 in Table 4 shows that 44 percent of the responding CFAs understood the EMH in all three of its forms, while only 38 percent of responding academicians could be similarly classified. This compares with only 29 percent for Big Eight partners and 25 percent for responding controllers. In each occupational group, however, more than half of the respondents were able to answer more than half of the questions correctly as regards their understanding of all three forms of the EMH. This may be seen from the column 4 percentages in the 50 percent cutoff rows.

What may be inferred about the levels of understanding among members of the occupational groups? Provided the problem of non-response bias has been satisfactorily dealt with, Dixon and Massey [1957, p. 450] use $1.22/\sqrt{n}=d$(istance) to establish the distance above and below the sample value within which there is a 90 percent chance the population parameter is contained. Given the sample sizes used in this study, it may be inferred that for each value in Tables 4, 5, and 6 the population parameter would be found to lie within approximately +/− ten percentage points of the sample value 90 percent of the time. Thus, inspecting Table 4, the range for *Fortune* 500 controllers can be estimated to lie between 0 and 17 percent for column 1, 0 and 10 percent for column 2, 11 and 31 percent for column 3, and 62 and 82 percent for column 4 (if one uses, say, the 25 percent cutoff shown in row 1).

TABLE 5

RESPONDENT ACCEPTANCE OF THE EMH BY OCCUPATIONAL GROUPS

Accepted research findings relating to EMH in . . .	*(1)* *excluded group*	*(2)* *none of its forms*	*(3)* *weak form only*	*(4)* *weak and semi-strong forms*	*(5)* *weak, semi-strong and strong forms*
Fortune 500 Controllers					
25% cutoff	7%	56%	10%	10%	17%
50% cutoff	26	41	29	3	1
75% cutoff	62	30	8	0	0
Accounting Academicians					
25% cutoff	11%	24%	18%	8%	39%
50% cutoff	23	25	38	2	12
75% cutoff	50	33	11	1	5
Partners of Big Eight Firms					
25% cutoff	16%	28%	21%	7%	28%
50% cutoff	39	29	28	1	3
75% cutoff	61	27	11	0	1
Chartered Financial Analysts					
25% cutoff	2%	42%	19%	6%	31%
50% cutoff	10	34	44	2	10
75% cutoff	35	45	15	1	4

It is important to note that the inferences and findings contained in this study relate only to attitudes and perceptions in the eight areas investigated. No statements are made about the relationship of these attitudes and perceptions to behavior. The nature of this relationship "is far from settled" [Watson, 1974, p. 530]. Watson [1974, p. 531] cites Fishbein [1967, p. 477], who notes that even the question of whether attitudes cause behavior or behavior causes attitudes is unsettled. In this study the focus is confined to attitudes and perceptions.

Acceptance of the EMH

Inspection of Table 5 shows the very limited extent to which respondents who understood the EMH actually accepted it. All respondents who did not understand the EMH in any of its forms (column 1 of Table 4) are included in column 1 of Table 5, since intellectually one cannot accept what one does not understand. Using the 75 percent cutoff, only one in 20 responding accounting academicians accepted the research findings relating to the EMH in its weak, semi-strong, and strong forms. The corresponding figures for chartered financial analysts are one in 25, and for partners in Big Eight firms, one in 100.

Column 2 indicates that most of the respondents who understood the EMH still believed that technical and fundamental analysis were useful in consistently obtaining abnormally high returns for the risk exposure assumed. Column 3 of Table 5 includes those respondents who believe that fundamental analysis, but not technical analysis, can be used to earn abnormally large returns.

While use of the 50 percent cutoff results in a sharp decline in the percentage of respondents classified as not understanding the EMH in any of its forms (column 1 of Table 5), most of the re-

TABLE 6

EXTENT OF AWARENESS OF THE ACCOUNTING IMPLICATIONS OF THE SEMI-STRONG AND STRONG FORMS OF THE EMH AMONG RESPONDENTS

	Semi-Strong Form			*Strong Form*		
	(1) Excluded	*(2) Not aware*	*(3) Aware*	*(4) Excluded*	*(5) Not aware*	*(6) Aware*
Fortune 500 controllers						
25% cutoff	7%	26%	67%	39%	13%	48%
50% cutoff	26	61	13	88	5	7
75% cutoff	62	38	0	100	0	0
Accounting Academicians						
25% cutoff	11%	18%	71%	33%	8%	59%
50% cutoff	25	60	15	85	2	13
75% cutoff	50	42	8	92	2	6
Partners of Big Eight Firms						
25% cutoff	17%	21%	62%	46%	6%	48%
50% cutoff	39	50	11	89	2	9
75% cutoff	62	37	1	98	1	1
Chartered fiinancial analysts						
25% cutoff	3%	33%	64%	36%	9%	55%
50% cutoff	12	77	11	89	2	9
75% cutoff	36	59	5	96	1	3

classified respondents are added to column 3—accepting only the weak form of the EMH. In terms of their effect on columns 4 or 5, the results do not seem to be highly sensitive to the use of either the 75 percent or 50 percent cutoffs. In particular, the belief seems to be strongly held that fundamental analysis can provide abnormally large returns. Only when the 25 percent cutoff is used do large increases appear among those who accept the research findings relating to all three forms of the EMH. As might be expected, academicians and CFAs consistently show the greatest degree of acceptance irrespective of cutoff percentage used.

AWARENESS OF THE ACCOUNTING IMPLICATIONS OF THE EMH

The final portion of the survey sought to assess the awareness of the accounting implications of the semi-strong and strong forms of the EMH. These results appear in Table 6. As is evident from Figure 1, assessment of the awareness of EMH accounting implications was made independently of acceptance of any of the three forms of the EMH. Understanding, at least of the semi-strong form, however, was required before a particular respondent's awareness of EMH accounting implications was assessed. Accordingly, those respondents who did not understand the weak and semi-strong forms were included in column 1 of Table 6. Those respondents who did not understand the EMH in all three of its forms as well as those who were not aware of the accounting implications of the semi-strong form were included in column 4 of Table 6.

The results show only a moderate sensitivity in awareness of the accounting implications of the EMH when 75 percent or 50 percent cutoffs are used. Extent of

TABLE 7

PERCEPTIONS OF USEFULNESS IN OUTPERFORMING MARKET AVERAGES OF CERTAIN INFORMATION AND METHODS COMMONLY USED IN INVESTMENT MANAGEMENT

Many investors use different sources of information trying to outperform market averages. Which methods do you think are useful in achieving this goal over the long-term?

Question number		*Users responding "yes" CFAs*	*Preparers responding "yes"*		
			F500	*AA*	*Big-8*
	(Some) methods used in investment management:				
18	1. technical analysis	57%	54%	58% (H)	46% (L)
19	2. fundamental analysis	99% (H)	80%	62% (L)	62% (L)
22	3. *beta* analysis	39% (L)	47%	54% (H)	44%
	(Some) information used in investment management:				
20	1. audited financial statements and qtrly reports	93% (H)	80%	71% (L)	75%
21	2. other accounting outputs	76% (H)	66%	46% (L)	53%
23	3. inside information	36% (L)	37%	78% (H)	45%

Note: (H): highest percentage responding "yes"
(L): lowest percentage responding "yes"
F500: *Fortune* 500 controllers
AA: accounting academicians
Big-8: partners of Big Eight firms
CFA: chartered financial analysts

awareness is generally highest among accounting academicians and chartered financial analysts. In absolute terms, these levels are quite low. Only 6 percent of responding academicians were classified "aware" of the accounting implications of the strong form when the 75 percent cutoff was used. The corresponding percentages for chartered financial analysts (3 percent), partners of Big Eight firms (1 percent), and controllers (0 percent) are even lower. As indicated previously, inferring awareness among the four occupational groups necessitates establishment of a band of ten percentage points above and below the sample values appearing in Table 6.

Examination of responses to individual questions revealed several interesting patterns which may have implications for education, policy-making, and research.

1. *Denial of semi-strong efficiency.* The highest percentage of non-conforming answers dealt with disagreement over the existence of semi-strong efficiency in the pricing of NYSE-listed firms. Over 90 percent of responding controllers and CFAs as well as 88 percent of Big Eight firm partners thought financial reports of NYSE-listed firms were useful in identifying over- or under-valued securities (question 2). The comparable figure for accounting academicians was 66 percent.

Questions 18 through 23 dealt with three types of information and three methods commonly used in investment management. Responses by occupational groups are summarized in Table 7. Examination of responses to question 19 shows that a majority of respondents thought that fundamental analysis could be used to outperform the market. Except for Big Eight partners, the majority of responding individuals in each occupational group thought that technical analysis could be used for this purpose also. Both sets of responses indicate disbelief in semi-strong efficiency. It is clear that more respondents, especially CFAs, thought fundamental analysis of great value in outperforming the market averages.

Beta analysis is one type of publicly available information which can be used [Sharpe and Cooper, 1972] to outperform the market averages. This does not contradict the concept of semi-strong market efficiency, but only indicates that investors who are prepared to assume above-average risks can expect, over the long run, to earn above-average returns. The only group with a majority of respondents accepting this proposition, however, was the accounting academicians (54 percent). Interestingly, the corresponding figure for the group expected to work most closely with *beta* analysis—the CFAs—was only 39 percent. This percentage was the lowest of the four groups surveyed. Marginal notations on some of the returned questionnaires may be of some explanatory value. A CFA who earned his MBA in 1970 wrote:

> —*Beta* analysis—I was exposed to it in school in a massive dose and preached it fervently on entering this business. Since then I've found experience + intuition provide a better measure of volatility than an inflexible computer.

Another CFA wrote, "I don't think *betas* are consistent over time." These views were typical of the CFA comments that appeared on several of the returned questionnaires regarding the stability and usefulness of *betas*.

In respect to disagreement with semi-strong market efficiency, this examination of responses on a question-by-question basis may help to explain the aggregate results of columns 1, 2, and 3 in Table 5. From an educational standpoint, it would appear that the evidence of semi-strong market efficiency in the price-adjustment process of securities listed on the NYSE has failed to prove convincing to a majority of accounting-information preparers and users.

2. *Usefulness of inside information.* Table 7 indicates that only accounting academicians (78 percent) thought inside information was useful in outperforming market averages. Frequent marginal notations by controllers and partners of Big Eight firms stressed the prohibitions against the use of such information. Academicians furnished no marginal notations addressing the legal issues involved, although one noted, "the availability of inside information [is] not desirable from the viewpoint of 'social fairness.'" The marginal notations of CFAs, however, indicated a substantial division of opinion on the use of inside information. These three comments may indicate typical positions on the use of inside information:

> Probably useful but I don't use and believe no one should.
> Illegal, but exists, unfortunately.
> We need all the help we can get, even if some of it is questionable.

Question 23 dealing with the usefulness of inside information brought forth the greatest number of marginal notations. It was also the question most frequently left blank (nine times, or 1.5 percent of analyzable responses).

3. *Usefulness of audited financial statements and quarterly reports.* A majority of all groups thought that audited financial statements and quarterly reports were useful in outperforming market averages. Besides being consistent with the previously discussed disbelief of semi-strong market efficiency, two other relationships appear to be worth mentioning. First, the percentage of users who

thought that financial statements were useful in outperforming the market was substantially higher than the comparable percentage for each of the preparer groups. Group responses to question 9 may partially explain this difference. Twice as many CFAs (56 percent) as partners of Big Eight firms (28 percent) thought that "accounting-determined risk measures were highly associated with market-determined risk measures."

The second relationship of interest is a comparison of responses to question 21 with responses to question 20. Each group had approximately 20 percent fewer "yes" responses regarding the usefulness of other outputs of a firm's accounting system in comparison to audited financial statements and quarterly reports. To what extent this may represent a comment by accounting-information preparers and users on the relative value of credibility compared to timeliness of accounting information remains a question for further investigation.

4. *Users versus preparers.* For five of the six items, user (CFA) responses were at extreme positions—highest (H) or lowest (L)—in Table 7. For each of those five items, the position of accounting academicians was at the other extreme. *Fortune* 500 controllers and partners of Big Eight firms were in the midrange. This pattern—CFAs and academicians taking positions at opposite extremes—appeared in other questions, such as 3 (which dealt with what sophisticated investors can accomplish with accounting information) and 10 (the basic statement of the EMH). Preparer-user differences disappeared with regard to question 5 on the desirability of income smoothing. At least two-thirds of all groups opposed income smoothing. Similarly, at least two-thirds of all groups thought accounting changes desirable that provided information previously available to or used only by insiders (questions 15 and 17).

SUMMARY

Based on the responses of accounting-information preparers and users, low levels of understanding of the EMH and its accounting implications as well as extremely low levels of acceptance of EMH research findings were inferred. Using the 90 percent confidence interval and the 75 percent cutoff, it was inferred that not more than 10 percent of the *Fortune* 500 controllers accept the research findings relating to the EMH, while between 15 percent and 35 percent understand the EMH in its three forms. For accounting academicians, the corresponding conclusion is that between 28 percent and 48 percent understand the EMH, while only up to 15 percent accept the research findings. Between 34 percent and 54 percent of CFAs understand, while only up to 14 percent accept. Among partners in Big Eight firms, between 19 percent and 39 percent understand, while only up to 11 percent accept the research results.

Some possible reasons for these positions were considered when the responses to individual questions were examined. These indicated strong belief in the value of fundamental analysis and the usefulness of audited financial statements and quarterly reports in outperforming market averages. More accounting-information users than preparers thought accounting-determined risk measures were highly associated with market-determined risk measures. Certain other differences between users and preparers were examined, including the outlying positions assumed by CFAs on some issues.

Occupational backgrounds were found to have a statistically significant, but only moderate, effect on response patterns. Marginal notations, used to reach certain impressionistic judgments, also appeared to follow certain patterns by occupational groups.

APPENDIX

Questions Used in the Survey

Respondents were asked to check "yes," "no," or "other" for each question to indicate agreement, disagreement, or no opinion/insufficient information.

1. There is publicly available information that can, fairly consistently, be used to identify over- or under-valued securities.
2. Financial reports of NYSE-listed firms are one type of publicly available information useful in identifying over- or under-valued securities.
3. Sophisticated investors may do better in the market because they understand more of the accounting information in financial reports than do naive investors.
4. Two NYSE-listed firms in the same industry and alike in all "real" economic aspects—like management ability and physical operating capacity—might consistently have different P/E ratios because of the way accountants prepare financial statements.
5. The accounting income smoothing encouraged in certain European countries to promote economic stability and more orderly securities markets is desirable.
6. Publication of financial reports frequently causes abnormally large and *persistent* changes in a firm's share price.
7. The more volatile a firm's risk-return characteristics, the less useful are its accounting reports in evaluating and predicting future returns.
8. The risk-return characteristics of most firms are fairly stable over time.
9. Accounting-determined risk measures (like earnings variability) are highly associated with market-determined risk measures.
10. Securities prices on the New York Stock Exchange fully reflect all publicly available information usually in a short period of time.
11. The recent R & D cost controversy was trivial: all that was needed was sufficient disclosure to permit investors to evaluate current R & D expenditures regardless whether they are capitalized or expensed.
12. The effects of alternative accounting procedures (like accelerated versus straight-line depreciation) on reported income are generally fully adjusted for in the relative prices of stocks on the New York Stock Exchange.
13. Some investors, using well-known charting or other technicians' approaches, have consistently "beat the market" without using any accounting information.

Sometimes firms make accounting changes that do not affect their "real" economic condition—like their tax liability. Do you think such changes are desirable if they:

14. Boost and maintain an artificially depressed share price?
15. Provide information previously used only by insiders?
16. Achieve a better matching of expenses and revenues?
17. Provide information previously available to investors with private access to investment information?

Many investors use different source of information trying to outperform market averages. Which methods do you think are useful in achieving this goal over the long-term?

18. Technical analysis (study of the history of the stock's price/volume movements).
19. Fundamental analysis (study of the difference between a stock's market price and its intrinsic value).
20. Audited financial statements and quarterly reports.
21. Other outputs of a firm's accounting system (like officers' speeches to investment analysts quoting recent sales or profit figures).
22. *Beta* analysis (an estimate of the extent to which a stock's market price moves with the overall averages).
23. Inside information (information not publicly available even to sophisticated investors).

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The Forecasting Ability of Accounting Risk Measures: Some Additional Evidence

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ABSTRACT: Previous research [Beaver *et al.*, 1970] indicated that a model using accounting data appeared to be able to forecast future levels of the market risk measure *beta* better than a model using past information on market risk alone. Subsequent improvements in models using past market risk data suggest that the superior forecasting ability of accounting data-based models ought to be reinvestigated. This study reexamines the forecasts of market risk produced by models based on accounting data and finds that these models still appear to forecast future levels of market risk marginally better than models based on past market risk information alone.

THE now familiar market model developed by Markowitz [1959] and extended by Sharpe [1964] describes the random process generating security returns.[1] The model provides a procedure for estimating the component of security returns that arises from co-movement of securities price with changes in the level of a representative market index. This component is called *beta* (β) or systematic risk. To estimate this statistic, linear regression with firm returns as the dependent variable and market returns as the independent variable are normally used in a regression equation of the following form:

$$\ln R_{it} = a_i + b_i \ln R_{mt} + e_{it}. \qquad (1)$$

where:

R_{it} = return on security i in period t
R_{mt} = return on a market portfolio in period t
e_{it} = error term

The b_i from regressions of this type have been shown to be an important explanatory variable of differences in *ex post* returns of portfolios of securities [Fama and MacBeth, 1973].

Beaver *et al.*, [1970, pp. 671–680] reported empirical evidence which indicated that a model using accounting data provided superior forecasts of the next period's market risk measure when compared to a forecasting model that uses previous market risk data only. The Beaver *et al.*, research was originally offered as evidence of the potential usefulness of accounting data to investors. (See Beaver [1972, pp. 416–17]; Beaver [1973, pp. 53–55]; Downes and Dyckman [1973, p. 312].) However, upon further reflection and the development of improved beta-based forecasting models (see Blume

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[1] For a more complete development of the market model see Beaver (1972).

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[1971] and Bogue [1973]), Beaver [1974, p. 23] indicates:

> . . . I strongly suspect that there may be little or no incremental forecasting power of an accounting-based model, when viewed in this context.

The market risk prediction models of Blume and Bogue do not incorporate any data that are not publicly available. Therefore, since the market is presumed to incorporate all publicly available information (semi-strong efficiency), these data ought to be impounded in securities prices, expected returns, and risk. Further, the observed market risk time series is a product of past prices which are probably based on a much broader set of information than accounting data. Thus, Beaver's suspicion of little or no forecasting power for accounting-based models seems appropriate.

The purpose of this paper is to reexamine the forecasting ability for systematic risk of models based on accounting data to determine whether the suspicions of little or no incremental forecasting ability are correct. Research by Kross [1975] for insurance companies supports the hypothesis of no incremental predictive ability for the accounting data-based risk prediction models. However, since his research examined only one industry, a more extensive study seems appropriate.

In the next section of the paper, the studies that have examined the behavior of systematic risk over time are reviewed. The purpose of this review is to develop a conceptual basis for three systematic risk prediction models that use only past estimates of beta to predict future levels of *beta*. A fourth *beta*-based risk prediction model is drawn from Beaver *et al.*, [1970]. These models are developed in the third section of the paper. Next, accounting risk measures are added to the four *beta*-based models to form a second set of risk predictors. These two sets of forecasting models are used to determine whether the addition of accounting data will improve forecasts of systematic risk. The next sections of the paper describe the data, the error measures and statistical tests used to compare the forecasting ability of the models, and the results. The final section provides explanations for the apparent superiority of the accounting-based models.

THE TIME SERIES BEHAVIOR OF SYSTEMATIC RISK ESTIMATES

Three of the recent models that partially describe the time series behavior of estimates of systematic risk are reviewed here. These models all develop systematic procedures to use past data on the time series of beta and/or parameters from *beta* estimations to adjust the current estimate of *beta*. The models are:

1. Order bias adjustment—a procedure for adjusting *beta* depending on its distance from the mean of all *betas*, 1.0, and the precision of its estimate.
2. Mean reversion adjustment—a systematic procedure to adjust *beta* for the observed tendency of *betas* to revert to the mean of all *betas*, 1.0.
3. Bayesian adjustment—a Bayes procedure for adjusting *beta* that uses data on the distribution of *betas* and data from the regression that estimated *beta*.

Order Bias Adjustments

Blume [1975], Blume and Friend [1973], Black *et al.* [1972], and Fama and MacBeth [1973], have argued that estimates of portfolio *betas* other than 1.0 are biased. Portfolio *betas* less than 1.0 tend to underestimate the true *beta*; conversely, portfolio *betas* greater than

1.0 tend to overestimate the true portfolio *beta*. They argue that this phenomenon occurs because of the order bias.[2]

A portfolio formed from securities for which estimated *betas* are, for example, less than one, is likely to contain three kinds of securities: (1) those whose estimates are correct, (2) those whose estimates are greater than the true *beta* and (3) those whose estimates are less than the true *beta*. If the portfolio is formed from extreme values, for example, the smallest 10 percent of the firm *betas*, then the order bias suggests that it is appropriate to expect that the portfolio will contain a higher proportion of securities whose estimated *betas* are smaller than the true *beta*. However, in a subsequent, second period the selection bias is less persistent. Therefore, the reestimated portfolio *beta* is unbiased and is expected to be closer to the mean of all *betas*, 1.0.

Blume [1975] suggests, assuming interperiod stationarity of β, that the following equation can be used to form an expectation for *beta* one period ahead that corrects for the order bias in the current estimate.

$$E(\beta_{i,t+1}|\hat{\beta}_{i,t})-1=\frac{\sigma^2(\beta_{i,t})}{\sigma^2(\hat{\beta}_{i,t})}(\hat{\beta}_{i,t}-1) \quad (2)$$

where

$\beta_{i,t+1}$ = next period's true beta
$\hat{\beta}_{i,t}$ = current estimate of beta
E = expected value

He further suggests that $\sigma^2(\hat{\beta}_{i,t})$ can be estimated by the sample variance computed from the estimates of β using a particular time period. An estimate of $\sigma^2(\beta_{i,t})$ can be obtained by subtracting the mean of the square of the standard error from each β estimation regression from $\sigma^2(\hat{\beta}_{i,t})$. Using these approximations, Blume [1975] found that the order bias adjustment for five seven-year periods 1926–1961 for 100 security portfolios were .92, .92, .89, .82 and .75, respectively.[3]

Mean Reversion

In two papers, Blume [1971, 1975] has observed that portfolio *betas*, and presumably individual security *betas* as well, tend to regress toward the mean of all *betas*, 1.0:

$$(\hat{\beta}_{i,t+1} - 1) = r(\beta_{i,t} - 1)$$

where

$r < 1$
$\beta_{i,t}$ = this period's true beta
$\hat{\beta}_{i,t+1}$ = next period's estimate of beta

This reversion Blume finds to be significant even after the order bias adjustment discussed above is removed. For the same period mentioned above, 1926–1961, Blume observes using the following regression equation;

$$(\hat{\beta}_{i,t+1} - 1) = r(\hat{\beta}_{i,t} - 1) + \varepsilon_{it}$$

where

$\hat{\beta}_{i,t+1}$ and $\hat{\beta}_{i,t}$ are as defined above

that the r coefficient was significant at .05 for the three grouping periods 1940–47, 1947–54, and 1954–61. A second test using the original period to group the data but using a second period for $\hat{\beta}_{i,t}$ and a third for $\hat{\beta}_{i,t+1}$ produced r's, significant at .05 for 3 of the 4 possible original grouping periods, 1933–40, 1940–47 and 1947–54.

Bayesian Adjustment

The Bayesian adjustment procedure in-

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[2] Blume's [1975] results indicate that the order bias adjustment is important but is less important than mean reversion in explaining the time series behavior of *beta*.

[3] The order bias adjustment is implemeted as follows: Assume that *beta* for security i was estimated to be 1.50 and the ratio of the variances of true *beta* to the variance of estimated *beta* is .9.

$$\begin{aligned} E(\beta_{i,t+1}|b_{it}) - 1.0 &= .9(1.5 - 1.0) \\ &= 1.45 \end{aligned}$$

corporates prior distributional information for *beta* in addition to the sample information which is used to form the first estimate. Vasicek [1973] and Bogue [1973] have suggested a Bayesian procedure for adjusting estimates of *beta* to minimize misestimation loss.

Adjusted beta is:

$$\hat{\beta}'' = \frac{\hat{\beta}'/s_b'^2 + \hat{\beta}/s_b^2}{1/s_b'^2 + 1/s_b^2}$$

where

$\hat{\beta}''$ = Bayesian Adjusted *beta*
$\hat{\beta}'$ = prior estimate of beta
$\hat{\beta}$ = sample estimate of *beta*
$s_b'^2$ = prior estimate of variance of *beta*
s_b^2 = sample variance of *beta.*

Depending on the *beta* being estimated, it may be reasonable to use data on the distribution of *beta* for New York Stock Exchange firms or *beta* distribution data for some other group to form estimates of $\hat{\beta}'$ and $s_b'^2$. As Blume [1975, footnote 10] notes for certain assumptions,[4] the Bayesian adjustment and order bias adjustment procedures will produce identical estimates of $\hat{\beta}''$. Those assumptions were not made in this study, so both models are used.

BETA-DATA-ONLY PREDICTION MODELS

In earlier portions of the paper, the use of β or $\hat{\beta}$ was consistent with the notation in the studies cited. From this point on: b_t = an estimate of *beta* for period t using equation (1), and $\hat{\beta}_t$ = a predicted value of *beta.*

Four *beta*-data-only prediction models[5] will be used in this study. The first is the model of Beaver *et al.*, [1970], which says that next period's *beta* is expected to be the same as this period's estimate of *beta*:

$$\hat{\beta}_{t+1,n_1} = b_t \tag{3}$$

where

n_1 = designation that $\hat{\beta}$ is a beta data only estimate
b_t = regression estimate of β from Equation (1)

The second is the original mean reversion model of Blume. This model says that next period's *beta* ought to be closer to the mean of all *betas*, 1.0, than the current estimate:

$$(\hat{\beta}_{t+1} - 1) = r(b_t - 1) \tag{4}$$

where

r = mean reversion coefficients estimated using data from periods t and $t-1$.

[4] $$n_3\hat{\beta}_{t+1} = \frac{\sigma^2_{b_t}}{\sigma^2_{\hat{b}_t}}(b_t - 1) + 1.$$

$$n_4\hat{\beta}_{t+1} = \frac{\dfrac{\bar{b}_t}{s_b'^2} + \dfrac{b_{i,t}}{s_b^2}}{\dfrac{1}{s_b'^2} + \dfrac{1}{s_b^2}}$$

Assume $\bar{b}_t = 1$, then $n_4\hat{\beta}_{t+1}$ can be shown to be equal to:

$$\frac{s'^2_{b_t}}{s_b^2 + s'^2_{b_t}}(b_{i,t} - 1) + 1$$

if

$$\frac{s'^2_{b_t}}{s_b^2 + s'^2_{b_t}}$$

is assumed equal to

$$\frac{\sigma^2_{b_t}}{\sigma^2_{\hat{b}_t}}$$

then the order bias adjustment and the Bayesian adjustment procedure are equivalent. In this paper data are used for the Bayesian adjustment procedure that are security-specific, while the order bias procedure treats the entire portfolio as a single security to develop the c statistic. Therefore, different estimates for $\hat{\beta}_{t+1}$ are produced.

[5] Such models are often called naive, as only data from past observations of the *beta* time series are used to form a forecast for β_{t+1}.

Rewriting Equation (4) so that the forecast of *beta* appears alone on the left side of the equation:

$$\hat{\beta}_{t+1} = rb_t - r + 1$$

Then:

$$\hat{\beta}_{t+1,n_2} = (1 - r) + rb_t \qquad (5)$$

The third model is the order bias adjustment. This model uses data from the distribution of beta and from the regression (1) estimating *beta*.

$$\hat{\beta}_{t+1,n_3} = c(b_t - 1) + 1 \qquad (6)$$

where

$$c = \frac{\sigma^2_{b_t}}{\sigma^2_{\hat{b}_t}}$$

[The ratio, *c*, is formed by dividing the variance of true *betas* by the variance of sample betas.]

An estimate of the variance of sample *betas* is formed from the distribution of estimated *beta*:

$$\sigma^2_{\hat{b}_t} = \frac{\sum_{i=i}^{n} (b_{it} - \bar{b}_t)^2}{n - 1}$$

An estimate of the variance of true *betas* is formed by subtracting from the estimated variance of sample *betas* the mean of the standard errors from each *beta* regression:

$$\sigma^2_{b_t} = \sigma^2_{\hat{b}_t} - \bar{e}_t$$

where

$$e_t = \frac{1}{n} \sum_{i=1}^{n} \frac{\sum_{j=1}^{m} e_j^2}{n - 2}$$

and where

e_j^2 = residual squared errors from individual regression equations
m = months over which regression is performed.

The fourth model is the Bayesian adjustment model. It is a Bayes procedure that uses data on the distribution of current betas and data on the precision of an individual estimate of *beta* to form a forecast of next period's *beta*:

$$\hat{\beta}_{t+1,n_4} = \frac{\bar{b}_t/s_b'^2 + b_{i,t}/s_b^2}{1/s_b'^2 + 1/s_b^2} \qquad (7)$$

where

$\bar{b}_t$ = mean of sample *betas* for period *t*
$b_{i,t}$ = estimated *beta* for firm *i* in period *t* from regression equation (1)
$s_b'^2$ = variance of the distribution of sample *betas* in period *t* minus the mean of the variances of the *betas* from the regression estimates
s_b^2 = variance of *beta* from the regression estimate.

ACCOUNTING-DATA-BASED RISK PREDICTION MODELS

Four accounting-data-based prediction models are used in this paper. In all of these models the accounting data are used as instrumental variables. This procedure can be adopted when the instrumental variables, the accounting risk measures in this paper, are presumed to be related to the true value of the independent variable, true *beta* in the current period in this study, and unrelated to errors in measuring the independent variable. The first is the model used in Beaver *et al.* [1970]. This model corresponds to the first *beta*-data-only model. It uses accounting data to represent this period's *beta*. Then, the forecast is presumed to be the current *beta*:

$$\hat{\beta}_{t+1,a_1} = w + \sum_i x_i(ARM_{i,t}) \qquad (8)$$

where

a_i designates that $\hat{\beta}_{t+1}$ is an accounting data-based estimate

w and x are regression coefficients estimated from the regression equation:

$$b_t = w + x_1 ARM_{1,t} + x_2 ARM_{2,t} + \cdots + e_t$$

where

ARM_i = value of an accounting risk measure for period t

b_t = regression estimate from Equation (1).

The second accounting data-based model is an analog to the mean reversion model for beta revision. The model presumes that the accounting data will revert toward their means as *beta* has been shown to do. The model forecasts the next period's levels of the *ARM* and then puts those estimates into the forecasting Equation (8):

$$\hat{\beta}_{t+1,a_2} = w + \sum_i x_i[y + z_i(ARM_{i,t})] \quad (9)$$

where w, x and *ARM* are as in Equation (8)

[y and z are coefficients that estimate the mean reversion properties of accounting risk measures between periods $t-1$ and t.]

The third accounting data-based model incorporates the accounting data into the order bias adjustment procedure.[6] This model is developed by using the *beta*-data-only order bias adjustment forecasts for period $t+1$ as the dependent variable in the regression equation:

$$\hat{\beta}_{t+1,n_3} = w + x_1 ARM_{1,t} \cdots$$

The w and x estimates and the *ARM* are then used to forecast the *beta* for the next period:

$$\hat{\beta}_{t+1,a_3} = w + \sum_i x_i(ARM_{i,t}) \quad (10)$$

The fourth accounting data-based model is like the third except that the dependent variable in the regression using accounting data is the Bayesian adjusted β forecast for period $t+1$, $\hat{\beta}_{t+1,n_4}$.

ACCOUNTING AND SYSTEMATIC RISK MEASURES

The nine accounting risk measures (*ARM* hereafter) used here were the same seven used by Beaver *et al.* [1970] plus the earnings variability and earnings covariability measures computed using earnings$_t$ divided by net worth$_{t-1}$ instead of earnings$_t$ divided by market value$_{t-1}$.[7] The *ARM* were computed for two periods, 1957–1962 and 1963–1968.

The systematic risk measures were estimated using ordinary least squares regression. R_m was the Value-Weighted Monthly Returns With Dividends Index supplied with the 12/1975 CRSP file. The three periods for systematic risk estimation were 4/57—3/63, 4/63–3/69, and 4/69–3/75.[8]

The sample was obtained by comparing the CRSP and COMPUTSTAT files to secure a list of firms with month 12 fiscal year end that possessed complete data for the necessary periods from both files. These procedures produced a sample of 210 firms.

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[6] This model was also prepared using the mean reversion properties of the accounting risk measures developed in equation (9). The forecasts using the ARM adjusted for mean reversion produced greater forecast error than the model described here.

[7] Beaver and Manegold [1975] have shown that the use of price as a deflator in the earnings variability and earnings covariability risk measures does not appear to produce spurious correlation between the ARM and *beta*. The net worth formulations were included to see if they would perform as reasonable substitutes for the price formulations. The results indicated that the net worth ARM were slightly less satisfactory (using F and R^2 as criteria) than their price analogs. The price ARM are used here to provide the maximum comparability between these results and those of Beaver *et al.* [1970].

[8] Six-year estimating periods for beta were selected so that the results would use as much return data as possible given the 20-year limitation from COMPUSTAT. Three equal length periods of six years resulted.

COMPUSTAT and CRSP file limitations do produce samples with certain biases. The firms tend to be larger than average, and are less risky than average. Those biases are, of course, present in the sample used in this study. Because of the use of a different time period, this sample differs somewhat from the Beaver *et al.* [1970] sample. The differences are not expected to affect comparisons between the results of this study and the Beaver *et al.* [1970] study. (See Table 1 and Beaver *et al.* [1970, p. 667], Table 3).

TABLE 1

SUMMARY STATISTICS FOR ACCOUNTING RISK MEASURES (1963–68)

Accounting Risk Measure	*Mean*	*Standard Deviation*
Payout	.4973	.1931
Growth	.0974	.0510
Leverage	.3813	.1561
Liquidity	2.8620	1.0751
Size	5.8704	1.3882
Earnings Variability (Price)	.0204	.0237
Earnings Covariability (Price)	1.0199	2.4961
Earnings Variability (Net Worth)	.0321	.0369
Earnings Covariability (Net Worth)	1.1295	2.2540

Selection of ARM for the Accounting Data-Based Models

The selection procedure for the accounting risk measures that were used was similar to that employed by Beaver *et al.* [1970]. First, all nine accounting risk measures were included in the regression equation:

$$\beta_t = w + \sum_I x_i(ARM_i) + e_{jt} \qquad (11)$$

The regression statistics indicated that some of the independent variables were correlated. The highest correlations were between the payout and asset growth variables, the leverage and liquidity variables, the two earnings variability variables, the two earnings covariability variables and the net worth earnings variability variable. None of the partial correlation coefficient of the independent variables with other independent variables was near zero. Therefore, a stepwise procedure for selecting variables to enter the regression was employed.[9] The asset size, asset growth and earnings variability (using the price formulation) were the only variables entered by the stepwise procedure and were selected as the independent variables for the accounting data-based models. The growth and earnings variability measures were also employed by Beaver *et al.* The size variable replaces payout from their study. In Table 2, the regression statistics are presented for the single security regression of b_t with the three *ARM* used. The results of this regression appear to be similar to those reported by Beaver *et al.* [1970, p. 672, Table 6].

TABLE 2

SUMMARY STATISTICS FOR SINGLE SECURITY INSTRUMENTAL VARIABLE EQUATION (Dependent Variable $\beta_{1963-68}$)

Mean b_t	1.1828	
Standard deviation b_t	.4305	
Constant	1.0793	(8.35)*
Growth$_t$	1.8167	(3.55)*
Size$_t$	−.0374	(−1.99)*
Earnings Variability$_t$	7.1803	(6.45)*
Standard Error of Estimate	.3704	
R^2	.2703	
F	25.4335	
Degrees of Freedom	206	

* t statistic appears in parenthesis beside variable.

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[9] F to enter and to remove were set at 3.5 and tolerance at .9. The dependent variable was 1963–68 *beta*, and the independent variables were accounting risk measures for the same period. The SPSS stepwise regression procedure used here directly estimates the regression coefficients for each coefficient set. This type of procedure avoids introduction of a bias in the *beta* coefficients noted by Goldberger (1964).

ERROR STATISTICS FOR SYSTEMATIC RISK PREDICTIONS

The four *beta*-data-only and the four accounting data-based models are used to forecast *beta*. These forecasts are compared with the actual betas, and error statistics for the models are produced. Since the Beaver *et al.* [1970] study produced error comparisons at both the single security and the portfolio level, the same type of analysis is performed here. Portfolios of size five were formed by taking the highest five *betas*, the next highest five, *etc.* until all 210 firms were placed into 42 portfolios. The single security results are presented first. The portfolio results follow. An interpretation of the results appears in the final section of the paper.

The error measures used here are a subset of those used in Beaver *et al.* [1970]. Percentage Times Lower Error and Percentage Times Lower Error in Tail Areas have been deleted, as more than paired comparisons are being made here. Percentage Explained Variance and M.A.D. have been dropped as well.[10]

Before the results are presented, the three error measures used in this study are explained. The variables used in the explanation are:

y_i = predicted value of *beta*
Y_i = observed value of *beta*
$\bar{Y}$ = mean of observed values of *beta*
n = number of predictions

Mean Error

Positive and negative errors in *beta* prediction are assumed to cancel out. An investor can be presumed to have a desired *beta* for a portfolio, and the relevant error is the amount by which the actual portfolio *beta* is different from the expected (predicted). The cost of error is presumed linearly and symmetrically distributed about the true portfolio *beta*.

$$\text{Mean Error} = \frac{\sum_{i=1}^{n} (y_i - Y_i)}{n}$$

Mean Square Error

The mean square error minimizes the expected cost of error even if the estimates are biased when the cost of error is quadratic and symmetrically distributed about the true value [Ackoff, 1962, pp. 260–261]. It is plausible to presume that some investors could have quadratic loss functions that are symmetric about the true portfolio *beta*.

$$\text{Mean Square Error} = \frac{\sum_{i=1}^{n} (y_i - Y_i)^2}{n}$$

Mean Absolute Error

Positive and negative errors to not cancel. Investors are presumed to hold a portfolio with a known and stable *beta*. A single security or small portfolio is considered for addition to the held portfolio. One measure of the relevant error is the absolute value of the difference between predicted and observed *beta*. The cost of the error is presumed to be symmetric and linear about the true *beta*.

$$\text{Mean Absolute Error} = \frac{\sum_{i=1}^{n} |y_i - Y_i|}{n}$$

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[10] Percentage Explained Variance as Beaver *et al.* compute it was: 1.0—(Mean Square Error/Variance β_{t+1}). It is probably better named Fraction Explained Variance. M.A.D. as Beaver *et al.* compute it was:

1.0—(Mean Absolute Error/Mean of Absolute Deviations from Mean β_{t+1})

In the Beaver *et al.*, [1970] study, the deflators were all larger than the numerators, so the error measures were all less than 1.0 but greater than 0. In this study the deflators were often such that the resulting error measure was negative. A negative error measure seems implausible and these two measures therefore, were dropped.

TABLE 3

MEAN b_t BY PERIOD

Period t−1 (*1957–63*)	*Period t* (*1963–68*)	*Period t+1* (*1968–75*)
1.0639	1.1828	1.1222

TABLE 4

SINGLE SECURITY FORECAST ERRORS FOR NAIVE MODELS

	Naive Model			
Error Measures	*#1*	*#2*	*#3*	*#4*
Mean error	.0606	.1458	−.0057	.0312
Mean square error	.1450	.1186	.0904	.1008
Mean absolute error	.2995	.2734	.2348	.2497
Mean of β_{t+1}	1.1222	1.1222	1.1222	1.1222
Variance of β_{t+1}	.1189	.1189	.1189	.1189
Mean of absolute deviations of β_{t+1} from Mean β_{t+1}	.2554	.2554	.2554	.2554

#1 Next period's beta forecast is this period's beta.
#2 Mean reversion.
#3 Order bias.
#4 Bayesian Adjustment.

Single Security

An examination of the error data in Table 4 for *beta* data only model 1, and the *beta* data in Table 3 indicates that the systematic risk estimates are less stable for the firms in this sample and for the time periods used than those of Beaver *et al.* [1970]. Mean error for this sample and periods 1963–68 and 1968–75 is .0606, while Beaver *et al.* [1970] found −.004 Mean square errors are .1450 and .093, respectively. The data in Table 4 also indicate that the Bayesian adjustment and the order bias adjustments procedures produced estimates with smaller error than did the *beta*-data-only model used by Beaver *et al.* [1970]. The mean reversion adjustment produced greater error than the Beaver *et al.* [1970] *beta*-data-only model. Using a *t* test on means, the order bias adjusted $\hat{\beta}_t$ produced significantly (.01) less error than the other three models on all three error measures.

The data in Table 5 indicate that the accounting data-based models produce smaller errors than their *beta*-data-only counterparts on all measures except mean error. A comparison of Tables 4 and 5 indicates that prediction error decreases more from *beta*-data-only model 1 to accounting data model 1 than in the Beaver *et al.* [1970] study. The accounting data-based model 3, using the order bias adjusted $\hat{\beta}_t$ as the dependent variable, produced the least error. Again using a *t* test on means only, the accounting data-based model 1 produced significant reductions (at .05 or less) in square error and absolute error when compared to its *beta*-data-only analog. Further, none of the differences in means between the order bias adjusted $\hat{\beta}_t$ errors and the means of the error measures for the other three models was significant (at .05 or less).

TABLE 5

SINGLE SECURITY FORECASTS FOR ACCOUNTING DATA-BASED MODELS

	Accounting-Based Models			
Error Measure	*#1*	*#2*	*#3*	*#4*
Mean error	.0606	.0207	−.0057	.0312
Mean square error	.0952	.0977	.0898	.0934
Mean absolute error	.2315	.2339	.2244	.2298
Mean of β_{t+1}	1.1222	1.1222	1.1222	1.1222
Variance of β_{t+1}	.1189	.1189	.1189	.1189
Mean of absolute deviations of β_{t+1} from Mean β_{t+1}	.2554	.2554	.2554	.2554

#1 Accounting Risk Measures as Instrumental Variables.

#2 Mean Reversion Adjusted Accounting Risk Measures as Instrumental Variables.

#3 Accounting Risk Measures as Instrumental Variables Order Bias b_t as Dependent Variable.

#4 Accounting Risk Measures as Instrumental Variables Bayesian Adjusted b_t as Dependent Variable.

TABLE 6

PORTFOLIO FORECAST ERRORS FOR NAIVE MODELS

	Naive Model			
Error Measure	*#1*	*#2*	*#3*	*#4*
Mean error	.0616	.1458	−.0057	.0312
Mean sqaure error	.0759	.0492	.0209	.0253
Mean absolute error	.2254	.1885	.1139	.1247
Mean of β_{t+1}	1.1222	1.1222	1.1222	1.1222
Variance of β_{t+1}	.0480	.0480	.0480	.0480
Mean of absolute deviations of β_{t+1} from Mean β_{t+1}	.1732	.1732	.1732	.1732

#1 Next period's beta forecast is this period's beta.
#2 Mean reversion.
#3 Order bias.
#4 Bayesian Adjustment.

TABLE 7

PORTFOLIO FORECASTS FOR ACCOUNTING DATA-BASED MODELS

	Accounting-Based Models			
Error Measure	#1	#2	#3	#4
Mean error	.0606	.0044	−.0057	.0312
Mean square error	.0457	.0205	.0181	.0178
Mean absolute error	.1466	.1071	.1047	.1061
Mean of β_{t+1}	1.1222	1.1222	1.1222	1.1222
Variance of β_{t+1}	.0480	.0480	.0480	.0480
Mean of absolute deviations of β_{t+1} from Mean β_{t+1}	.1732	.1732	.1732	.1732

#1 Accounting Risk Measures as Instrumental Variables.

#2 Mean Reversion Adjusted Accounting Risk Measures as Instrumental Variables.

#3 Accounting Risk Measures as Instrumental Variables Order Bias b_t as Dependent Variable.

#4 Accounting Risk Measures as Instrumental Variables Bayesian Adjusted b_t as Dependent Variable.

Portfolio

The data in Table 6 and Table 7 indicate that (1) error reduction does result from using portfolios; (2) the results are again similar to those of Beaver *et al.* [1970] for *beta*-data-only model 1 and accounting data-based model 1; (3) the *beta*-data-only order bias adjustment model and the accounting-data-based mean reversion model appear to produce least error; and (4) the accounting-data-based models all out-perform their *beta*-data-only analogs. Using the *t* test on means, all of the *beta*-data-only and accounting-data-based models produced significant (at .05 or less) reductions in the mean of square error and mean of absolute error when portfolio models are compared to single security models. Though the mean revision accounting data-based model produced the smallest mean error, it was significantly smaller (at .05 or less) than only the order bias-adjusted model for mean error. For the other two error measures, none of the accounting data-based models produced significantly smaller errors. Only the mean reversion model produced a significant (at .05 or less) reduction for mean square error and mean absolute error when portfolio basis *beta*-data-only and portfolio basis accounting data-based models are compared.

ANALYSIS

The most important result of this study is the small but consistent superiority in *beta* prediction of the accounting data-based models over their *beta*-data-only counterparts. This result is unexpected. However, the results are for a particular sample and period, so they may not consistently occur. They are strong enough to suggest that additional study be undertaken to determine whether they can be reproduced. Another possible explanation for the results is that the *beta*-data-only models while superior to the one used by Beaver *et al.* [1970], do not incorporate as much information as is available from the *ex post beta* time series. Further improvements in these models might remove the apparent marginal predictive ability of the accounting data-based models.[11]

The apparent superiority of the Bayesian or order bias adjustment procedures over the other two *beta*-data-only models was due to the movement of the estimated *betas* of most of the securities toward 1.0 between periods t and $t+1$. Had the securities' *beta* continued to move away from 1.0, as they did from $t-1$ to t, the other two *beta*-data-only models might have performed relatively better. However, data presented by Blume [1975, p. 8, Table 3] and summarized in Table 8 indicate that it is much more likely that β will move toward 1.0. Even for portfolios with betas near 1.0, it appears that β's are more likely to move toward the mean. For portfolios with the most extreme values of β, it appears highly unlikely that movement away from 1.0 will occur. Therefore, one would expect that the superiority of the Bayesian or order bias adjustments over other *beta*-data-only models like the one used by Beaver *et al.* [1970] will prevail.

TABLE 8

INTERPERIOD MOVEMENT OF THE MEAN β OF BLUME'S 100 SECURITY PORTFOLIOS

	Direction of β Moved in Period $t+1$	
	Toward 1.0	*Away from 1.0*
β_t greater than .2 from 1.0	14	1
β_t less than .2 from 1.0	7	4

The real test of a risk prediction model is whether it can be used to improve portfolio revisions for risk adjustments. Prediction is useful if one can form estimates of future risk levels that are more accurate or more timely than those produced by employing the market model. Because the market model requires several periods of *ex post* data and because return periods shorter than one month appear to produce significantly more error in *beta estimates* [Abdel-khalik, 1974], timely and accurate estimates of *beta* may be difficult to obtain directly. Therefore, an approach using prediction based on the time series characteristics of *beta* with accounting-based adjustment and a *beta* estimated from monthly data produced over a several-year period may be the most satisfactory method of risk estimation and portfolio risk adjustment. Future research to determine the ability of these and perhaps improved models to aid in a risk maintenance strategy seems appropriate.

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[11] Maier, Peterson and Vander Weide [1977, pp. 218–219] present results that indicate that co-movement between α, β and σ^2 is potentially exploitable in explaining the β time series.

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The Pollution Control Tax Incentive: A Non-Incentive

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ABSTRACT: Congress has re-enacted the accelerated amortization deduction for certified pollution control facilities, presumably to stimulate investments in such facilities. Through the use of a present-value federal income tax impact model, it is shown that rarely will the provision serve as a tax "incentive" for this type of investment when elected by a manufacturing firm.

CONGRESS is empowered to enact legislation which is considered to be in the best interests of our country. Often it uses the Internal Revenue Code and its ancillary laws either to induce socially responsible behavior within the business world or to reward (or at least not to penalize) such behavior. In order for its legislation to act as an "incentive," the legislation must have an impact upon the *planning* activities of a business firm. To act as a reward for socially responsible behavior, Congressional legislation must provide such a reward *after* the action is undertaken. Many times, legislation is designed to act as both an incentive for action and as a reward for such action, because it is presumed that the businessman is aware of the potential and actual benefits of some specific action.

In the long-range planning activities of most companies, management will usually decide upon its future capital investments. To do so, many firms will engage in a relatively sophisticated capital investment analysis. Consideration of the tax consequences is an important aspect of this analysis. If Congressional tax legislation is to be an "incentive" for socially responsible business activities, it is at this planning stage that the legislation must appear to have a significantly favorable impact on corporate taxes. Correspondingly, if tax legislation is to serve as a reward for specific behavior, the actual corporate taxes must be reduced to a substantial degree when a firm (regardless of whether it had considered the incentive during its planning stage) prepares to file its annual federal income tax return.

Control of pollution is an important objective of our society. Presumably, in order to stimulate investments in pollution control equipment, the "certified pollution control facility" (hereafter CPCF) accelerated amortization deduction was written into the Internal Revenue Code in order to stimulate (and reward) investments in pollution control equipment. The purpose of this paper is to demonstrate, through the use of a present-value federal tax impact model

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and related sensitivity analyses, that (1) this electible CPCF amortization deduction is usually *not* a significant incentive in the planning stages of an environmental investment, and (2) that it is usually *not* a significant reward in the actual filing of a typical manufacturing firm's annual federal income tax returns.

CPCF Tax Provision

In order to offset increased investment and production costs, Congress enacted the CPCF tax provision in 1969. This law expired in 1975 and was modified and reenacted in 1976. Initially, this accelerated amortization deduction could be elected in lieu of the usual depreciation deduction. Shortly thereafter, the investment credit was again re-enacted into the tax law. The tax law was written so that the CPCF deduction had to be elected in lieu of both the investment credit and the depreciation deduction. Research at that time [Feinschreiber, 1970; Journal of Taxation, August, 1975; Nikolai and Ricketts, 1974; Worthy, 1972] indicated that election of this CPCF deduction, in certain instances, was not an optimal decision. Certain Congressman apparently recognized this problem, and a bill to modify and extend the law was introduced late in 1976. However, the bill was not considered before the end of of the legislative session, and the law expired.

In the spring of 1976, the Senate introduced an amendment to the Tax Reform Bill of 1976, which provided for a liberalization and reinstatement of CPCF accelerated amortization. In conference, limited modifications were made. With the passage of the Act, this tax incentive for investments in pollution control equipment was once again a part of the Internal Revenue Code. The amendment provided for two major changes in the related tax provisions: it broadened the definition of a CPCF, and it provided for a partial investment credit.

The CPCF tax provision is contained in Section 169 of the Code. It currently states:

> Every [company] at [its] election, shall be entitled to a deduction with respect to the amortizable basis of any certified pollution control facility . . . based on a period of 60 months. . . . The amortization deduction provided by this section . . . shall be in lieu of the depreciation deduction with respect to such pollution control facility . . . [IRC, Sec. 169(a)].
>
> The term "certified pollution control facility" means a new identifiable facility which is used . . . to abate or control water or atmospheric pollution or contamination by removing, altering, disposing, storing, or preventing the creation of pollutants, contaminants, wastes, or heat and which . . . does not significantly increase the output or capacity, extend the useful life, or reduce the total operating costs of such plant . . . or . . . alter the nature of the manufacturing or production process or facility and which . . . the state certifying authority . . . and . . . the Federal certifying authority has certified . . . as being in furtherance of the . . . prevention of . . . pollution . . . [IRC, Sec. 169(d)].

A partial investment tax credit is allowed, equal to 50 percent of the amortizable basis times the investment credit rate, as long as the facility's useful life is not less than five years [IRC, Sec. 46(c)(5)]. Thus, in lieu of the usual depreciation deduction and a portion of the investment credit, a firm may elect to amortize the CPCF over a period of 60 months, the amortization beginning with the first month of operation. However, if a firm does elect the CPCF acceleration amortization, the excess of this amortization over the usual depreciation deduction is a "tax preference item," subject to the minimum tax [IRC, Sec. 57(a)(4)].[1]

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[1] In order to offset certain "loopholes" in the federal income tax, a minimum tax on "tax preference items" was instituted in 1969. Essentially, the tax is computed

Certain restrictions are placed upon the amount of the pollution control investment which can be utilized as the CPCF amortization basis. To determine this basis, the initial cost of the investment must be reduced by any cost *not* attributable to the abatement and control function [Treas. Reg. 1.169-2(a)(1)] and any expected profits resulting from the anticipated sale of recovered waste [Treas. Reg. 1.169-3(c)]. Furthermore, the amortization is limited to the proportion of the cost attributable to the first 15 years of its normal useful life [IRC, Sec 169(f)(2)]. For facilities having useful lives of more than 15 years, the basis is computed as the original basis (less non-abatement costs and waste profits) times the following fraction: 15 divided by the facility life. Thus, the CPCF amortizable basis is the initial cost of the pollution control investment reduced by "multiple-function," "expected profits," and "useful life" amounts. The yearly amortization is computed by dividing the amortizable basis by 60 months and multiplying the result by the number of months in operation during the year. The non-CPCF basis of the investment cost is the portion of the investment in the pollution control facility which is *not* a part of the CPCF amortizable basis. For instance, if the cost of certain "add-on" pollution control equipment with an 18-year useful life is $20,000, of which $2,000 is expected to be recovered through the sale of recovered waste, then the CPCF amortizable basis is $15,000 [($20,000 − $2,000) × 15/18], and the non-CPCF portion is $5,000. The non-CPCF basis is subject to the entire investment tax credit and to the usual accelerated depreciation deduction. Unlike the CPCF amortization and the non-CPCF accelerated depreciation deductions, the investment tax credit is deducted directly from the income tax (or, if necessary, carried forward or back) to determine the total tax due in the year in which the facility is placed in service.

THE PRESENT VALUE TAX IMPACT MODEL

As suggested earlier, in order for tax legislation to serve as an incentive for a firm to invest in pollution control equipment, the legislation must have an impact upon the planning activities of corporate management. Numerous capital investment analytic methods are used by firms to evaluate the attractiveness of potential capital investments. The most sophisticated involve variations of the discounted cash flow technique, which explicitly recognizes the time value of money. For the present-value method, estimates are made of the amount and timing of initial and subsequent investments, the amounts and timing of operating cash flows (including tax cash flows, assuming election of the most advantageous deductions), the economic life, the end-of-life salvage value, and a required rate of return. All of the cash flows over the economic life are discounted to the present, using the firm's cost of capital. Generally, if the net present value is positive, the project is desirable; if negative, it is undesirable. For a pollution control investment, often a firm does not undertake such an extensive capital investment analysis. In a situation where the contemplated CPCF is an "add-on" piece of equipment (as is assumed in this paper) which causes no significant change in out-of pocket operating costs and revenues, the analysis may focus specifi-

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by multiplying the 15 percent rate times the sum of the tax preference items, reduced by 100 percent of the regular income tax liability for corporate taxpayers. In addition to the excess CPCF amortization, numerous other tax preference items exist. These include such items as the excess net long-term capital gain, the excess of accelerated over straight-line depreciation on real property, and the excess of accelerated depreciation over straight-line depreciation on certain leased property.

cally upon the impact on federal income taxes resulting from election of the CPCF tax "incentive."

To facilitate such a tax planning analysis, a firm may use a "model" which focuses only upon the present value of the tax impact resulting from a pollution control capital investment. The rudiments of such a model are available in the literature. Ingram [1977] presented an analysis which highlighted the changes in tax policy as a result of the Tax Reform Act of 1976. He used an algorithm which summarized the purported differences in the present value tax flows resulting from the CPCF amortization election. However, apparently a misinterpretation of the tax code and other omissions were made in the analysis[2] which led to the erroneous conclusion that the election would be advantageous in the majority of cases. Nikolai and Elam [1977] proposed a "financial statement" policy model which Congress might utilize (as a substitute for the more traditional economic models used in current policy analysis) to evaluate proposed tax legislation, and then applied this to compare the different policy impacts of the expired, proposed, and current CPCF tax provisions. Unfortunately, this model was incomplete because it did not focus adequately upon such items as the minimum tax and carrybacks and carryforwards of the investment credit and because it was static rather than dynamic in the sense that it focused upon a single assumed taxable income rather than on variations in taxable income. Nonetheless, certain of the model parameters may be extrapolated and extended for use by a firm in the current analysis.

A modified present-value federal income tax impact model may be utilized which focuses only upon the differences (changes) in those interrelated elements of the annual federal tax returns resulting from the election of the CPCF deduction for a recently purchased CPCF. These interative elements include the CPCF amortization, accelerated depreciation, the investment credit, and the minimum tax. The accelerated depreciation related to the pollution control equipment is included because this deduction is assumed to be used if the CPCF amortization is not elected. The minimum tax element is included because a portion of the CPCF amortization is a tax preference item. Finally, the investment credit is included because its amount is a function of the CPCF amortization election. Other specific elements would be included when they apply to a particular firm. Figure 1 shows the relevant interrelated factors,[3] their relationships to a firm's annual federal taxable income, and the change in annual federal income tax cash flows resulting from the election of the CPCF amortization. The model is designed to accommodate numerous potential interactions. It works as follows. If the CPCF tax "incentive" is elected, CPCF accelerated amortization will increase, as may the minimum tax. The usual accelerated depreciation will increase due to any non-CPCF portion of the investment, but the accelerated depreciation on the CPCF portion is forgone. The investment credit will decrease and, additionally, may have to be carried back or forward, depending upon the

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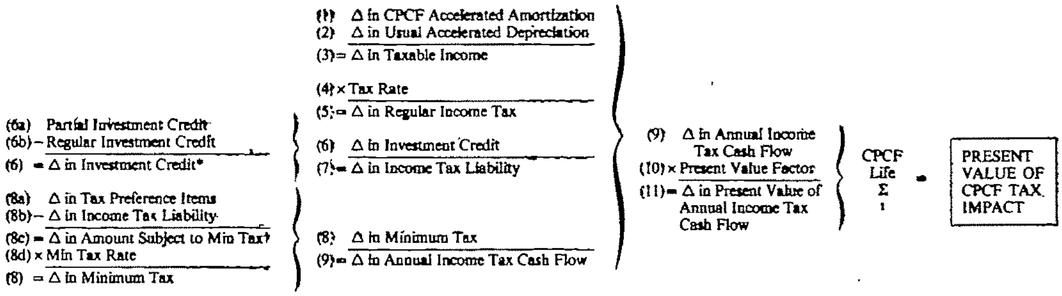
[2] The misinterpretation lies in his handling of the investment credit. Ingram suggests that only 50 percent of the amortizable basis of the property is eligible for the investment credit, regardless of whether the property is amortized over the 60 month period or depreciated over its useful life (p. 512). However, in the latter case, the entire investment credit is available on the property. See IRC, Sec. 46(c)(5).

[3] Although the CPCF federal tax provision may have an impact upon certain state tax provisions, these later provisions are too diverse to be included in the general model. Furthermore, bonus depreciation in the initial year is not included because of its relatively insignificant impact upon the model outcome.

FIGURE 1

GENERAL MODEL: PRESENT VALUE OF TAX IMPACT RESULTING FROM CPCF AMORTIZATION ELECTION


(1) Δ in CPCF Accelerated Amortization
(2) Δ in Usual Accelerated Depreciation
(3) = Δ in Taxable Income
(4) × Tax Rate
(5) = Δ in Regular Income Tax
(6a) Partial Investment Credit
(6b) – Regular Investment Credit
(6) = Δ in Investment Credit*
(8a) Δ in Tax Preference Items
(8b) – Δ in Income Tax Liability
(8c) = Δ in Amount Subject to Min Tax†
(8d) × Min Tax Rate
(8) = Δ in Minimum Tax
(6) Δ in Investment Credit
(7) = Δ in Income Tax Liability
(8) Δ in Minimum Tax
(9) = Δ in Annual Income Tax Cash Flow
(9) Δ in Annual Income Tax Cash Flow
(10) × Present Value Factor
(11) = Δ in Present Value of Annual Income Tax Cash Flow
CPCF Life
Σ
1
=
PRESENT VALUE OF CPCF TAX IMPACT

* If the total amount of the regular income tax is negative, the investment credit should be carried back or carried forward as conditions dictate.
† If the amount subject to the minimum tax is less than or equal to zero, the minimum tax is zero.

impact on taxable income. The final output of the changes in the interactive parameters is the present value of the Federal income tax impact due to election of the CPCF tax "incentive." A positive number indicates present-value cash savings from the CPCF amortization due to lesser tax payments, while a negative number reflects greater present-value tax cash outflows due to the election. From a theoretical viewpoint, then, a firm would utilize such a model in the planning stage to evaluate the attractiveness of a potential pollution control investment. The higher the magnitude of a positive number, the greater the likelihood the CPCF tax provision will serve as a social responsibility "incentive" during this planning stage.

Furthermore, even if a firm did not undertake any capital investment planning analysis for a CPCF investment (because, for instance, it is required by law to make the investment), once the equipment goes "on-line," such a model may be used to assist management in the decision concerning whether to elect to take the CPCF deduction in its actual federal income tax return. That is, management should elect only those deductions which minimize (and thereby provide a "reward" for the socially responsible pollution control investment) the firm's overall federal tax burden. This model can provide relevant information in this regard.

OPERATION OF THE MODEL

In order for the CPCF tax provision to be either an incentive (in the planning stage) or a reward (in the tax filing preparation stage), the final output of the previously presented model must be a significant positive present-value federal tax impact (*i.e.*, savings). While the actual federal tax impact will depend upon the specific parameters for a particular CPCF investment by a firm, useful inferences concerning this incentive-reward potential may be drawn from the general model if it is made operational for a hypothetical but representative firm. The model development, its operation, and the results are presented below.

A computer algorithm is developed which reflects the interrelationships of the model. The current federal income tax rates and the current minimum tax rates are used. Double-declining balance (DDB) depreciation with a switch to straight-line depreciation[4] at the appropriate time is included, as is straight-line CPCF amortization over a five-year period. The investment credit routine includes a full investment tax credit for non-CPCF facilities and a partial investment tax credit for CPCF facilities, with an appropriate carryback and carry-forward sub-routine. A minimum tax computation involving the excess of CPCF accelerated amortization over usual depreciation is included. Finally, a routine for computing, storing, summing, and printing of the present value(s) of the CPCF tax impact completes the algorithm.

In the operation of the model, several parameters must be postulated. For example, assume the point estimates listed in Table 1 for a model manufacturing firm.

TABLE 1

INITIAL OPERATION: POINT ESTIMATES

Parameters	*Point Estimates*
Investment in CPCF	$1,000,000
Life of CPCF	17 years[a]
Company Cost of Capital	15 percent
Investment Credit	Entire amount usable in initial year
Minimum Tax	Not applicable[b]

[a] This parameter estimate is selected because it causes the "useful life" routine to become operative.

[b] It is assumed that the total tax preference items do not exceed the income tax liability.

Inserting these parameters into the model results in the following differences between using and not using the CPCF incentive for the first year that the facility is operated. If CPCF amortization is elected, the first-year CPCF amortization amounts to $176,471 [$1,000,000 × 15/17 (the year constraint) × 1/5], and the depreciation deduction forgone is $103,806 ($117,647 DDB depreciation on the entire $1,000,000 less $13,841 DDB depreciation on the 2/17ths portion of the investment which is depreciable but not amortizable). Applying the appropriate tax rate to the resulting *decrease* in taxable income $72,665 yields a decrease in the regular income tax of $34,879. A decrease of $44,118 in the investment tax credit offsets this later savings. This decrease arises from the allowable investment tax credit under CPCF of $55,882 (1/2 of $1,000,000 × 15/17 × .10 plus $1,000,000 × 2/17 × .10) less the investment tax credit allowed when CPCF amortization is not elected, of $100,000 ($1,000,000 × .10). The resulting *increase* in the income tax liability is $9,239. The minimum tax is zero in this case, because it is assumed that the model firm has no other significant "tax preference items" and the total amount of the items (CPCF amortization in excess of allowable depreciation plus the non-significant items) is not greater than the tax liability. The $9,239 increase in tax cash outflows multiplied times .8696 (the present-value factor for one year at 15 percent) yields an increase in the present value of the *first* year income tax cash flow of $8,034. This amount, combined with the *remaining* 16 other annual present values, generates a positive net present value of the CPCF tax impact (savings) in the amount of $54,680. These amounts and their relationship to the model parameters outlined in Figure 1 are summarized in Table 2.

The initial results indicate that, given the assumed point estimates, the election of the CPCF "incentive" provides only moderate present value federal income tax savings (*i.e.*, only 5.5 percent of the initial investment). However, because

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[4] It is recognized that a switch from double-declining to sum-of-the-years' digits to straight-line depreciation would result in slightly greater tax savings. However, for the sake of modeling simplicity, only the double-declining to straight-line switch was utilized.

TABLE 2

GENERAL MODEL: INITIAL RESULTS

		Year 1	Years 2–17	
(1)	Δ in CPCF Accelerated Amortization	+$176,471		
(2)	−Δ in Usual Accelerated Depreciation	− 103,806		
(3)	=Δ in Taxable Income	= − 72,665[a]		
(4)	×Tax Rate	.48[b]		
(5)	=Δ in Regular Income Tax	= − 34,879		
(6)	+Δ in Investment Credit	+ 44,118		
(7)	=Δ in Income Tax Liability	= + 9,239		
(8)	+Δ in Minimum Tax	+ 0		
(9)	=Δ in Annual Income Tax Cash Flow	= − 9,239[c]		
(10)	×Present Value Factor	× .8696		
(11)	=Δ in Present Value of Annual Income Tax Cash Flow	= −$ 8,034	+ $62,714	= $54,680

[a] The sign changes at this point because an *increase* in deductions causes a *decrease* in taxable income.

[b] Taxable income is assumed to be greater than $50,000 so that any change in income is subject to a 48 percent tax rate.

[c] The sign changes again to associate a minus (−) sign with tax cash outflows and a plus (+) sign with tax cash savings.

the Asset Depreciation Range (ADR) guidelines have caused asset lives to be shortened for depreciation purposes, the 17-year life may be unrealistically long. Additionally, certain firms may have sufficient "tax preference items" to be subject to the minimum tax, which will then be increased by the excess CPCF amortization. Furthermore, the assumed cost of capital and the usability of the investment tax credit may not apply to a particular firm. To address these potential parameter modifications, sensitivity analysis is incorporated into the analysis. Sensitivity analysis in this context may be defined as "... a study to determine the responsiveness of the conclusions of an analysis to changes ... in parameter values used in the analysis [Rappaport, 1967, p. 455]." This analysis may range from varying the estimate of a single parameter while holding the others constant, to varying the estimate of a combination of relevant parameters. Both approaches are used in the subsequent operation of the model. Table 3 presents the ranges of parameters used to analyze the model's sensitivity.[5]

TABLE 3

SENSITIVITY ANALYSES AND PARAMETER CHANGES

Parameter	*Parameter Range*
Cost of Capital	10 to 20 percent (in increments of 5 percent)
CPCF Economic Life	5 to 17 years (in increments of 3 years)
Investment Credit	Carryforward (in increments of 2 years)
Minimum Tax	Applicable to 50 percent and 100 percent of excess CPCF amortization

Change in Firm Cost of Capital

To analyze the effect of alternative corporate costs of capital upon the tax impact of the CPCF election, the cost of capital is varied in increments of five percent, from 10 through 20 percent, while all other factors are held constant. The results are shown in Table 4.

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[5] A sensitivity analysis also was performed on the effect of a change in the size of the investment upon the present value of the tax impact. The analysis revealed that the magnitude of the tax savings as a percentage of the investment would remain the same. The results are not presented here.

TABLE 4

EFFECT OF DIFFERENT COSTS OF CAPITAL UPON PRESENT VALUE OF TAX SAVINGS RESULTING FROM CPCF ELECTION

Cost of Capital	*Present Value of Tax Impact*
10%	$44,704
15	54,680
20	56,787

Where:
Investment = $1,000,000
Life = 17 years.

TABLE 5

EFFECT OF DIFFERENT FACILITY LIVES UPON PRESENT VALUE OF TAX IMPACT RESULTING FROM CPCF ELECTION

Facility Life (Years)	*Present Value of Tax Impact*
5	$−47,583
8	−29,378
11	7,690
14	37,647
17	54,680

Where:
Investment = $1,000,000
Cost of Capital = 15 percent.

In Table 4, one may see that, given a $1,000,000 investment and a 17-year asset life, the present value of the CPCF tax savings accruing to a firm which elects the CPCF amortization modestly increases as the assumed cost of capital increases. The increase appears to be curvilinear, with the savings rising at a decreasing rate.

Change in CPCF Economic Life

To analyze the effect of a change in the assumed economic life of the CPCF upon the tax impact, all factors except the facility life are held constant, and the modeling process is repeated in increments of three years for facilities with lives from five years through 17 years. The result, shown in Table 5, is a series of values for different assumed lives, each indicating a favorable (positive) or unfavorable (negative) present-value tax impact from electing the CPCF amortization tax "incentive" for the model firm.

From an interpolation of Table 5, it may be observed that for a manufacturing firm having a 15 percent cost of capital and making a $1,000,000 investment in a CPCF, the election of the CPCF accelerated amortization deduction "tax incentive" is not financially advantageous unless the facility has a depreciable life of nearly 11 years.

It is informative to relate these results to the ADR "lower limit" lives suggested in Revenue Procedure 77-10 for selected "high environmental impact" industries. These lives are summarized in Table 6. Most of the suggested lives for assets used in these selected high environmental impact industries are shorter than necessary to make the CPCF deduction election financially attractive.

TABLE 6

ADR LOWER LIMIT LIVES FOR SELECTED HIGH ENVIRONMENTAL IMPACT INDUSTRIES

Industry	*ADR Lower Limit Life (Years)*
Pulp and Paper Manufacturing	10.5
Chemical Manufacturing	9
Primary Ferrous Metals Manufacturing	14.5
Primary Non-Ferrous Metals Manufacturing	11
Textiles Manufacturing	7

Source: Rev. Proc. 77-10, 1977-1 CB 548–568.

Change in Investment Tax Credit Availability

If the investment tax credit is not used up in the initial year of operation of the CPCF due to tax limitations, it may be carried back or forward. The focus here is upon investment tax credit carryforward.[6] To facilitate the discussion, recall that in the initial operation of the model for a firm having sufficient annual income so that the entire amount of the investment credit is usable in the year in which the CPCF is placed into operation, the present-value tax savings would be $54,680 over the life of the CPCF.

To analyze the effect of changing the usability of the investment tax credit upon the tax impact of the CPCF election, all factors except the absolute value of the annual taxable income are held constant. Two alternative assumptions are introduced concerning the magnitude of the taxable income in the early years of the CPCF operation. These assumptions are that the firm's income before depreciation and CPCF amortization is zero for (1) the first two years of the CPCF life or (2) the first four years of the CPCF life. Each assumption results in a net operating loss requiring an investment tax credit carryforward. The model results (including that from the initial operation) are shown in Table 7.

TABLE 7

EFFECT OF INVESTMENT TAX CREDIT CARRYFORWARD UPON TAX IMPACT RESULTING FROM CPCF ELECTION

Carryforward	*Present Value of Tax Impact*
None	$54,680
2 years	41,626
4 years	6,490

Where:

Investment = $1,000,000
Life = 17 years
Cost of Capital = 15 percent

Because of the complexity of the parameter interactions, a brief explanation of the changes is presented. For the first alternative (two years of net operating losses), the positive effects of electing CPCF amortization are diluted by two factors. First, the net operating losses and investment tax credit must be carried forward to the end of the third year.[7] The present value of the tax benefits of the investment tax credit and the CPCF amortization for the first two years is reduced from the $61,233 generated in the initial operation of the model to $49,720 in the current alternative. In addition, the net operating losses in years 1 and 2 caused a minimum tax liability in those years of $9,400 and $11,231, respectively. The total minimum tax liability ($20,631) is not paid until the end of year 3, resulting in a present value of $13,565. Had income been sufficiently high the first two years, no minimum tax would have been paid, because the tax liability would have exceeded the tax preferences. The net effect of two years of net operating losses is to reduce the present-value tax savings from $54,680 to $41,626. A similar analysis reveals that if net operating losses are assumed for the first four years of the CPCF life, the election of CPCF results in a net present value of only $6,490 again compared to $54,680 if income had been constantly high. For firms incurring net operating losses in the initial years of the CPCF operation, the election of CPCF amortization results in substantially less present-value tax savings.

Change in Minimum Tax

Companies are likely to vary in the magnitude of their tax preference items subject to the minimum tax. In the initial operation of the model the minimum tax is not applicable, because the tax preference items are assumed to be minimal. To analyze the effect of a change in the magnitude of these preference items upon the tax impact of the CPCF election, two alternative assumptions are postulated. The model is altered so that tax preference items other than excess CPCF amortization are of a sufficient magnitude that (1) all of the excess CPCF amortization over the usual depreciation deduction cause the minimum tax to increase, or (2) one-half of the excess CPCF amortization causes an increase in the minimum tax. These results, along with the result from the initial operation of the model, are shown in Table 8.

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[6] Investment credit carryback is not analyzed, because it is assumed that any tax benefits would accrue in the year of the filing for the carryback and that this filing would take place in the initial year. Consequently, the present-value tax impact of a carryback is the same as that when the entire investment tax credit is usable in the initial year.

[7] For modeling simplicity, it is assumed for each alternative that the income in the first year subsequent to the net operating loss years is of a sufficient magnitude to absorb all the net operating losses and investment credit carryforwards.

TABLE 8

EFFECT OF DIFFERENT PERCENTAGES OF THE EXCESS CPCF AMORTIZATION CAUSING INCREASE IN THE MINIMUM TAX

Excess CPCF Amortization Affecting Min Tax	*Present Value of Tax Impact*
100%	$ 8,655
50	31,668
0	54,680

It may be seen that the minimum tax has a significant dampening effect upon the present-value tax savings. When the entire excess CPCF amortization causes an increase in the minimum tax, the present-value tax savings is reduced to $8,655 compared to the $54,680 present-value tax savings, assuming no minimum tax. Consequently, the CPCF tax "incentive" is even less attractive for firms incurring the minimum tax.

Change in Cost of Capital, CPCF Life, and Minimum Tax

Since the individual sensitivity analyses involving a profitable firm reveal that independent changes in the assumed cost of capital, asset life, and minimum tax applicability each cause a significant change in the present value of the tax impact, one additional sensitivity analysis combining these three parameter changes is performed. Figure 2 shows the results of combining the range of costs of capital from the first sensitivity analysis with the range of facility lives from the second analysis. The results are shown for Firm A, which incurs no minimum tax, and for Firm B, whose entire amount of the excess CPCF amortization is subject to the minimum tax.

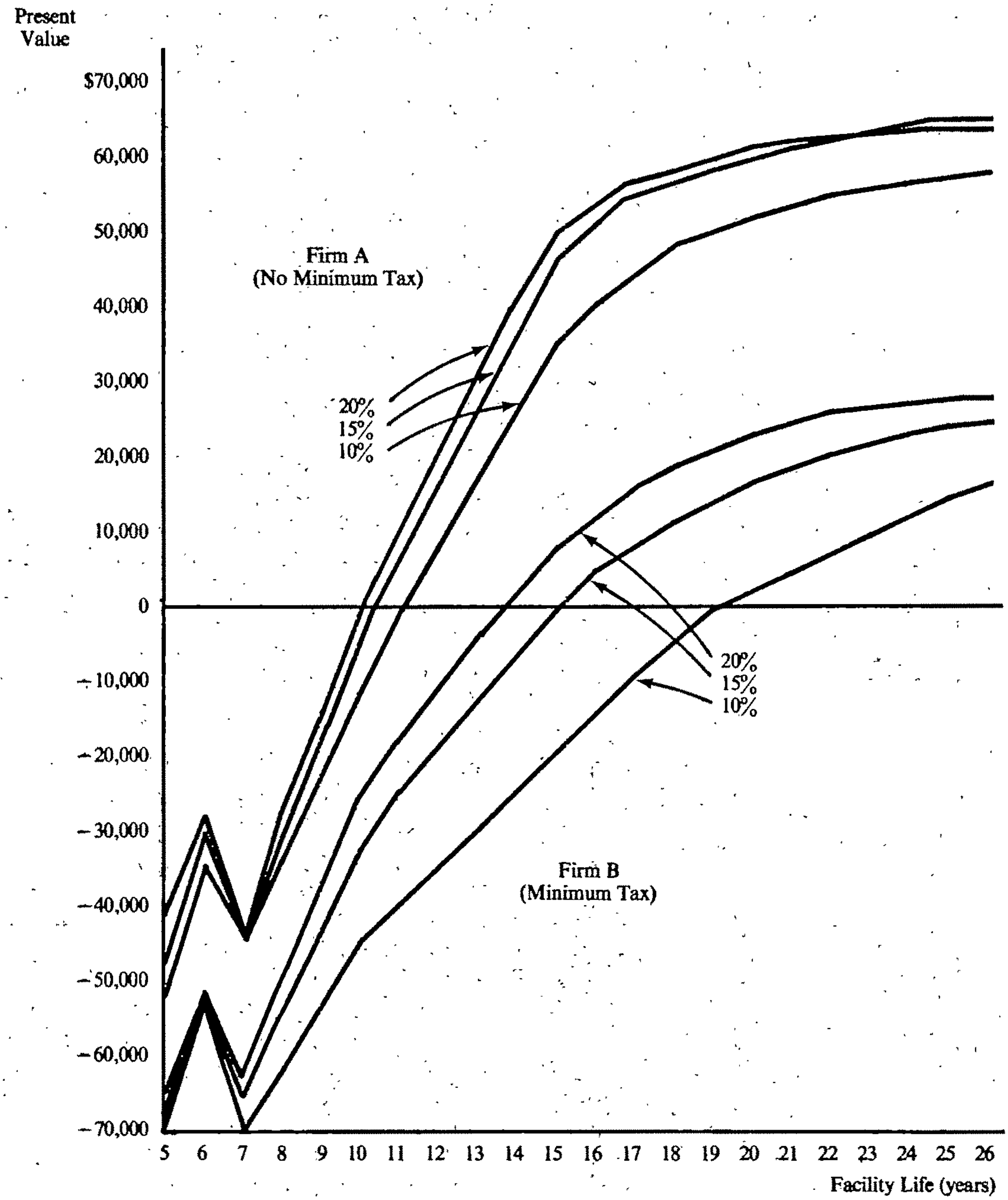
In Figure 2, it may be seen that a doubling of the cost of capital (from 10 to 20 percent) combined with different facility lives causes two changes to occur. First, for almost every specified facility life, the magnitude of the present-value tax savings is higher. The greatest difference occurs at about a 15-year life, where the differences in the savings are nearly $15,000 (Firm A) and $24,000 (Firm B) more for the higher cost of capital. Second, the "indifference" point (*i.e.*, the zero point, where the present value of the tax savings from electing the CPCF tax incentive is neither positive or negative) is reduced from nearly an 11-year life to about a 10-year life for Firm A and from about a 19-year life to less than a 14-year life for Firm B.

CONCLUSIONS

Firms invest in pollution control equipment for a variety of reasons. Many do so in order to comply with federal and state pollution-control standards. Some firms, because they have accepted a social responsibility in this area, may make such an investment even when not legally required to do so. When planning for major capital investments, many firms perform a present value capital investment analysis in order to evaluate their attractiveness. If the present value of the anticipated cash inflows exceeds the present value of the anticipated cash outflows, the investment is deemed to be

FIGURE 2

PRESENT VALUE OF TAX IMPACT FROM CPCF INCENTIVE FOR THREE COSTS OF CAPITAL COMBINED WITH DIFFERENT FACILITY LIVES AND DIFFERENT MINIMUM TAXES[a]



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[a] The apparent inconsistency of tax savings for five-year lives when compared to longer lives is explained by recognizing that the investment tax credit increases from 6.7 percent to 10 percent for the non-CPCF case when asset lives are greater than six years, while remaining a constant 5 percent for CPCF assets.

"attractive." In the case of a potential investment in pollution-control equipment (particularly an "add-on" piece of equipment, as is assumed in this paper), rarely will the pre-tax cash inflows be of sufficient magnitude to enable such a project to be financially attractive. In this case, a federal subsidy in the form of a significant potential decrease in federal taxes may serve as a tax "incentive" to stimulate such investments. Furthermore, such a subsidy may serve as a "reward" (*i.e.*, reduce federal taxes) when the investing firm files its annual federal income tax return. Presumably, this incentive and reward policy is what Congress intended when it re-enacted the CPCF accelerated amortization provisions in 1976.

The results of the present-value federal income tax impact model developed and illustrated in this paper present substantial evidence that the CPCF provision is not likely to serve as either an incentive or a reward. Briefly reviewing these results, it is found that in many cases, assuming that firms operate within a 10- to 20-percent cost-of-capital range, election of the CPCF provision does *not* yield additional present value tax savings over and above the tax savings that would arise from the usual accelerated depreciation deduction and available investment tax credit. Only when the facility has at least a 10- to 12-year life for a continually profitable manufacturing firm paying no minimum tax or at least a 14- to 19-year life for a manufacturing firm paying the minimum tax, is the CPCF election financially attractive. Even then, on an investment of $1,000,000 the *maximum* tax savings amounts to less than $66,000 (or roughly 6.6 percent of the investment) for a profitable firm investing in a facility with a life of 26 years. The tax saving is substantially less for a firm in an initial net operating loss position.

Given the above observations, there are several reasons why the current CPCF tax provision will not provide much of a stimulus to investments in pollution control equipment. First, even in cases where the CPCF amortization election does provide a positive present-value tax impact, the magnitude of this flow is small compared to the cost of the investment. Second, due to the rapidly improving technology related to pollution-control equipment, it is likely that firms, when given a choice between comparable alternatives with different lives, will opt for the shorter-lived facility. This decision would preclude any benefits from the CPCF provision. Third, even if only one alternative is available, a brief perusual of the allowable asset lives for selected "high environmental impact" industries under the current ADR system suggests that in many, if not most, cases its life will be shorter than that necessary to make the CPCF election financially attractive. Finally, in interviews with several key financial executives of major corporations, [Nikolai, Bazley, and Brummet, 1976] the opinion was expressed that the benefits derived from the CPCF deduction election were not worth the significant amount of time, energy, and paperwork they had to expend in obtaining "certification" of their facilities by the appropriate pollution-control agency.[8]

In summary, it is concluded that the tax incentive is really a non-incentive and the reward is not worth the cost. It is hoped that the analytical model developed herein will be of use to Congress in evaluating the financial attractiveness of other proposed tax incentive bills and to companies in developing related tax strategies.

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[8] This was generally the case even in situations where the firm could have taken advantage of the lower interest rates on tax exempt "pollution control" industrial revenue bonds, available for the financing of "certified" facilities.

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EDITORIAL

Notes and Comments

One of the effects of the expansion of scientific empirical research in accounting during the 1960s was a vigorous debate among researchers over method. After decades of mostly casual inquiry, researchers began to borrow tools of analysis from statistics, the behavioral fields, and economics and finance in order to make defensible statements about phenomena in the world of affairs. Disagreements promptly arose over the aptness of the choice of methods and whether they were soundly applied to the question. In 1971, Editor Eldon S. Hendriksen inaugurated the Correspondence section as a niche for this instructive (and occasionally emotional) dialogue. I propose to continue this section but under the title "Comments," which is a more familiar description to be found in scholarly journals. The Comments section will, of course, be open for dialogue on the entire range of previously published writings—not only empirical research.

Appearing for the first time in this issue is a section entitled "Notes." It will contain some articles that hitherto were published as Main Articles as well as others that might not have been published at all. This new receptacle will contain, among other things, developments and improvements in research methods which are more than tutorials, brief extensions of previously published research, and worthy replications and other studies which add usefully, but not significantly, to the literature. While the Main Articles section is designed, for the most part, to report important increments in the stock of accounting knowledge, "Notes" and "Comments" will accommodate discussions and analyses that serve to facilitate, nurture, and support the primal search for that knowledge. The Comments section will, of course, be open for dialogue on the entire range of previously published writings—not only empirical research.

STEPHEN A. ZEFF
Editor

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EDUCATION RESEARCH

Edwin H. Caplan, Editor

EDITOR'S NOTE

Manuscripts submitted to this section should conform to the format described in the April, 1978, issue of THE ACCOUNTING REVIEW. The articles should fall into one of four categories: (1) articles that report empirical research findings regarding learning theory and technique applied in accounting courses at the collegiate level of instructions; (2) articles that report on developments in the field of accounting education, such as those dealing with educational philosophy or descriptive innovations for the classroom; (3) articles dealing with professional development; and (4) articles dealing with practical or theoretical issues directly related to classroom instruction, *i.e.*, providing specific classroom applications.

All manuscripts and correspondence should be sent directly to the section editor, Edwin H. Caplan, Anderson School of Business, University of New Mexico, Albuquerque, New Mexico 87131.

Levels of Cognitive Complexity and the Design of Accounting Curriculum

Joel H. Amernic and Robin J. Enns

ABSTRACT: In this paper the cognitive complexity construct, which has recently been introduced into the accounting literature, is examined from the point of view of accounting pedagogy. Empirical and theoretical literature (from the discipline of education) on students' cognitive complexity, is brought to bear on the problems of teaching accounting. Given certain reasonable goals of accounting education, the analysis leads to the conclusion that knowledge about the existence of the cognitive complexity construct, and its level, is important to accounting educators from the viewpoint of curriculum design. The paper concludes by suggesting several specific implications of the construct for accounting education.

RECENTLY, a number of papers have appeared in the accounting literature which suggest the importance of research in human information processing for the design of accounting systems [Miller and Gordon, 1975; Miller, 1972; Revsine, 1970; Wilson, 1973; San Miguel, 1976]. A fundamental concept in this research has been the notion of an individual's "conceptual level"—that the degree of conceptual complexity a person

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can render intelligible in the information he is processing is a function of the interaction between the individual and his environment. The main objective of this paper is to show that the interaction between a student's conceptual level and his learning environment is important in the formal education of accountants, and to suggest some implications of this interaction for accounting education, especially in the area of curriculum design.

The second objective of this paper is motivated by the continuing curriculum debate in accounting involving the appropriate degree of structure in the learning environment [Rosen, 1975; Smith, 1975; AAA, 1972, pp. 310–312]. On one side are those who advocate a relatively unstructured setting, with liberal use of case materials, and related pedagogical techniques. On the other side are those favoring a more structured setting, preferring directive problem material, practice sets, *etc.* The issue here has less to do with the absolute positions held about the learning environment, than with the relative emphasis which is desired. Thus, a second objective of this paper is to provide a framework against which to evaluate the relative merits of the two extreme positions in this curriculum debate. Adherents of either view probably subscribe to similar goals for accounting education. What differs, however, are the means through which they seek to achieve these ends.

The paper is structured as follows. First, we develop a list of goals for accounting education. This is done since it seems impossible to discuss constructs important to accounting education unless one can assess whether or not these constructs may be useful in accounting education, and for this purpose a list of goals is needed.

Second, we develop a statement of the theory underlying the conceptual level construct, and relate it to the educational process. Third, we will attempt to assess the implications of the conceptual level notion for accounting education in the following areas:

(1) Implication for a developmental goal of accounting education;
(2) Implication for a taxonomy of learners;
(3) Implication for curriculum design; and,
(4) Implication for evaluating the "high-structure, low-structure" controversy.

Fourth and finally, we address some problems of implementing the conceptual level concept.

In order to develop arguments to achieve our two objectives, we will first prepare a list of goals for accounting education which should be acceptable to most accounting educators. We can then use the list as a constant check on the adequacy of the arguments we develop supporting our paper's objectives.

Many accounting educators would not object to the six goals for the accounting curriculum developed by the 1971–72 AAA Committee on Courses in Financial Accounting [1972, p. 299]. These goals are:

1. Provide a basic understanding of the conceptual framework underlying the measurement and communication of economic data.
2. Provide the future accountant with the technical competence for effectively measuring, assimilating, and communicating economic data, primarily for external use.
3. Provide an understanding of alternative models for measuring and communicating economic data, primarily for external use.
4. Be relevant to current problems and

adaptive to changing social and economic conditions.

5. Cultivate a keen, analytical, inquiring mind.
6. Provide the student the incentive to grow and keep pace with ever-changing issues, conditions, forces, and ideas.

These goals have a great amount of innate appeal and therefore face-validity, especially when compared with the functions that the accountant is expected to perform *after* he has completed his formal (university) accounting educational process, some of which were made explicit by the Planning Committee of the AICPA [1966]:

> [reviewing] many aspects of an organization's activities and procedures ... providing objective advice and consultation on various management problems [involving] budgeting, cost control, profit planning, internal reporting, automatic data processing, and quantitative analysis ... tax planning and advice [and] representation of clients before government agencies ... participating in conferences with government agencies such as the Securities and Exchange Commission [and] bankers ... [acting as consultants in] business, civic and other problems. . . .

We can make the AAA list of goals of accounting education more economical by summarizing them in the following manner. Three reasonable goals for accounting education are to develop in the student:

1. a constructively critical understanding of the uses and limitations of accounting data;
2. the ability to "transfer" accounting ideas to new situations. For example, while the student is achieving this constructively critical understanding in (1), he should also learn how to use the tools developed in the process in new situations, and also how to modify these tools where warranted;
3. the ability to relate to one's environment in a mature and evolving fashion. In other words, the accountant should be able to generalize and adapt his accounting tool kit.

In this paper, we argue that unless appropriate recognition is made of the importance of, and the interaction between, conceptual level and learning environment, the achievement of these objectives will be impaired.

THEORETICAL CONSTRUCT

A clear statement of a theoretical construct that can be used in exploring the educational ramifications of the relationship between a student's conceptual level (CL) and his learning environment is found in the research and writing of Dr. David E. Hunt. Rooted in the work of Harvey, Hunt, and Schroder [1961], Hunt has developed a learning model based on the CL notion. Learning models are "piecemeal approaches to [the] meaning [of learning] which reduce the bewildering complexity of direct experience to the more limited scope of human comprehension by *selecting* relevant features." [Zais, 1976]. With the ultimate purpose of facilitating long term student growth, Hunt's model matches alternative ways of controlling the student's learning environment (through employing various teaching strategies) with student "learning style," a term used in educational practice to describe a student's CL [Hunt, 1974]. Hunt's model can affect long-term growth because it is conceived as a developmental model; *i.e.* it emphasizes specifying the student's CL needs at various "contemporaneous" stages of his develment, as well as his longitudinal requirements for growth. The notion of a developmental stage is a feature of some learning models. It is a rational way of conceiving and to some extent specifying an organism's development toward an ideal.

Hunt treats CL development in terms of the interdependence of interpersonal maturity and conceptual complexity. Interpersonal maturity is seen as proceeding from stage A, where a person is immature and unsocialized, to stage B, where he is dependent and conforming, to stage C, where he is independent and self-reliant. Developmentally, the stages of interpersonal maturity are described as the increasing understanding of oneself and others. Variations in the student's conceptual complexity are viewed correspondingly. The characteristics of persons at stage A are that they tend to think in concrete terms, are impulsive, and have poor tolerance for frustration, with the result that they process less information complexity. At stage B, they are concerned with rules and are dependent on authority and categorical thinking. At stage C, they are inquiring, self-assertive, and have more alternatives available [Hunt and Sullivan, 1974]. Developmentally, the stages of conceptual complexity are viewed as a student's relative abilities to discriminate and to integrate: the less the student's ability along these lines, and the less his interpersonal maturity along the former lines, the lower his CL. This relationship is summarized in Table 1. An instance of viewing interpersonal maturity in tandem with conceptual complexity is that a stage B person differs from one at stage C not only in being more dependent, but also in being less conceptually complex, *i.e.* less capable of analysis and synthesis.

TABLE 1

DEVELOPMENTAL CONCEPTUAL LEVEL RELATIONSHIPS

Developmental Sequence	*Interpersonal Maturity*	*Conceptual Complexity*	*Symbolic Terms*
Stage C	Independent, Self-reliant	Inquiring, Uses Alternatives	
Stage B	Dependent, Conforming	Rules, Authority, Categories	
Stage A	Immature, Unsocialized	Concrete, Poor Tolerance For Ambiguity	V

The main dimension that can be adjusted by teaching strategy in matching the learning environment to learning style (CL) is the degree of structure employed. For instance, progress from stage A to stage B "requires the conceptual work of defining the external boundaries and learning the generalized cultural standards which apply to both self and others" [Hunt, 1974]. For the student in class, this means finding out the dimensions of the subject-matter for which, as practitioner, he is responsible, and learning, as well, the fundamental behaviors appropriate to that subject-matter area. The instructor's task is to assess the students' learning styles, and then to adjust the degree of structure in his teaching, and by so doing, to "pull" the student from stages A to B. To this end, Hunt [1974] says:

> Since rules are learned best when the rules are clear, the ideal environment to foster development to stage B is therefore a clear, consistent, highly structured one.

Keeping in mind the developmental nature of student progress, the instructor can assess when the student achieves the general standard incorporated in the stage B conceptual level. On the way to stage C independence, this general standard serves as an anchoring reference point for the student. From it, as he builds self-confidence and identity, he can gradually come to know and to explore the assumptions underlying his learning behaviors and the consequences of these assumptions for his practice. Hunt [1974] notes that:

> Self-definition occurs through a process of breaking away from the standard developed in stage B. Learning about how one is distinctly oneself provides the basis for beginning to accept individual responsibility for outcomes.

The student's sense that he is able, on his own terms, to contribute significantly to problem-solving in the subject-matter area concerned, may appear initially in exaggerated form, but this is "nonetheless the person's first awareness of his own feelings as cues for differential action." [Hunt, 1974].

The value to instructors of this developmental CL learning structure is that it can provide an informed access channel into the educational needs of students, in both immediate ("contemporaneous") and longitudinal terms. Hunt [1975] indicates a way of classifying students by learning style, in suggesting that the instructor place the students on a "structure line." To do this, the instructor needs to know something about how high and low structured environments are defined. There are three main dimensions involved, and they vary internally, depending on high or low structure. The first is the extent of the instructor's responsibility for actual learning activities (the greater it is, the higher the structure); the second is variation in the specificity of instructions; and the third is the degree of advance organization of material. Hunt notes [1975] that:

> Highly structured environments are (1) instructor-centered, (2) involve preorganized material, and (3) involve very specific instructions and expectations. Approaches which are low in structure (1) [are] more likely to be determined by the student, (2) involve general instructions, and (3) material which is not pre-organized.

When relating student CL to the "structure line," Hunt sees the following matches:

> Given the characteristics of low CL persons (categorical, dependent on external standards, and incapable of generating their own concepts), one predicts that they will profit more from highly structured approaches. Given the characteristics of high CL learners (capable of generating new concepts, having internal standards to a higher degree, and being capable of taking on different views), it is predicted that they will either profit more from low structured approaches or will be unaffected by the degree of structure. *Thus the heart of the CL matching model is the generally inverse relation between CL and degree of structure*, [1971, 1975, emphasis added].

Table 2 summarizes the relationships between learning style and need for structure.

TABLE 2

LEARNING STYLE AND STRUCTURE NEED RELATIONSHIP

Developmental Sequence	*CL*	*Learning Style*	*Matched Environment*
Stage C	High (W)	Needs Less Structure	Low Structure
Stage B	Low	Needs Some Structure	Moderately High Structure
Stage A	Very Low (V)	Needs Much Structure	High Structure

Once the instructor has this knowledge, the possibility is open for him to vary systematically the structure of his teaching strategies with all of his students for a short time to observe how each one learned and felt. For instance, during one five-class interval he might use a highly structured and organized approach, and a very unstructured approach during the next, taking care to note student reactions to each. Based on his findings, the instructor can then group his class according to the CL needs of his students, and can correspondingly adjust the structure of his presentation of subject-matter to them. In so doing, the instructor can facilitate long-term student growth in terms of the students' developing conceptual abilities to discriminate and to integrate the subject-matter, and through the students' concurrently increasing understanding of themselves and others.

SOME IMPLICATIONS FOR ACCOUNTING EDUCATION

Implication for a Developmental Goal of Accounting Education

The reasonable goals of accounting education which we listed earlier are a function of the complex, shifting, and often conflicting environment faced by professional accountants. In order to perform in a successful, adaptive manner in this accounting environment, it is desirable that an individual be not only intelligent, but be also cognitively complex. Thus, there is an inescapable matching or correspondence between the goals of accounting education (and the accountant's environment), and the desirable CL of professional accountants.

This matching requirement strongly suggests a developmental goal for accounting education, namely, to create learning environments so that the student's progression to the desirable (*i.e.*, high) cognitive level is enhanced. Some students may never attain the level. One of the implications of this concept for accounting education, then, is to ensure that these students fail to grow along the dimension of cognitive complexity because of an upper bound or inherent limitation in their own individual cognitive growth curve rather than because of a poorly planned (*i.e.*, mismatched, uncoordinated) sequencing of learning environments during their formal accounting education.

Implication for a Taxonomy of Learners

Different individuals of the same chronological age often display differences in intelligence and, not surprisingly, in cognitive complexity. Perry [1970] found that university students in the same year (*i.e.*, freshmen, juniors, *etc.*) and of comparable intelligence were at different points along their CL growth curve. An important implication of this empirical observation for accounting education (given our other discussions in this paper) is that one way to ensure that all accounting students have the opportunity to maximize their individual cognitive complexity, is to "fine-tune" their formal learning environments.

For example, all freshmen accounting students could be assigned to one of two groups: (a) relatively high cognitive complexity; and (b) relatively low cognitive complexity. As we point out in a later section, measures of cognitive complexity are well-developed in the educational literature and have recently appeared in the accounting literature [San Miguel, 1976], so that the classification mechanism is operational and, thus, feasible. Students assigned to the low CL group would be provided with a relatively highly structured environment. Their learning environment initially would consist of directive-type problem material (for example; "given a set of account balances, classify the accounts into asset, liability, owners' equity, revenue and expense categories and compute net income for the period"); it would be textbook-centered, and a more "traditional" or authority-based text would be used (such as Niswonger and Fess; Pyle and White, *etc.*). As time passed, the highly structured learning environment would be slowly modified in the direction of less structure—some multi-subject problems and moderately-structured case material would be introduced, and the learning environment would become less instructor and text-oriented. (Note that the *same* text could still be used, but now it would be viewed as only *one* of the facets of the learning environment).

This modification of structure of learning environment would act "to pull the individual toward the next stage of development." [Joyce and Weil, 1972, p. 303]. Accounting instructors could check individual students' progression along the CL continuum using the formal methods developed by Hunt [1974], or the less formal interview methods developed by Perry [1970], or a combination of the two.

Students allocated to the high CL group would be put in freshmen accounting classes having a relatively unstructured setting (*i.e.* use of cases; readings to supplement the text, *etc.*). In theory, both the high and low CL groups would eventually wind up at the same relative CL level further on in their university careers—*they simply need different environments to get there.* This implication for accounting education could affect the way accounting educators view the first course and also higher-level courses.

In many universities, all students must take the initial accounting course, insofar as both content and learning environment are concerned. Some schools have two streams—one for the accounting major (preparer-oriented), and one for the non-major (user-oriented). This suggests the existence of a difference in content and possibly in learning environment. Whether schools have common or different first courses for students with different career objectives, course design seems not to be based upon cognitive complexity development and its relationship to the individual and learning environment. The strong implication of the research discussed above is that course design should be based on these factors.

While it seems desirable to match the educational environment to the appropriate student CL, other (confounding) factors may conceivably dampen the usefulness of this matching exercise. The work of Holland [1973] and others on vocational choices provides an example of one possible confounding factor. Holland has categorized several hundred occupations into six general vocational groups. Each group has a certain set of unique attributes—for example, the "conventional" group is "characterized by the dominance of environmental demands and opportunities that entail the explicit, ordered, systematic manipulation of data, . . . , organizing written and numerical data." Holland has also categorized six personality types, each type corresponding to an analogous vocational group. A major thrust of his work is that people tend to perform better and be happier in vocational environments which conform to (or are congruent with) their personality types. For example, conventional personality types perform best and are happiest in jobs which display conventional vocational environmental characteristics, whereas artistic personality types prefer artistic vocational environments. If we view the *content* of the accounting course as creating a sort of vocational environment, it would most likely be close to the "conventional" model in Holland's terminology. Indeed, Holland classifies the CPA's job as mainly conventional, with some "investigative" and "social" aspects [p. 116]. If we view the content *plus* learning environment of the accounting course as creating a sort of vocational environment, it becomes more difficult to classify within Holland's scheme, although an unstructured, case-oriented learning environment would probably move the setting more towards Holland's "artistic" category.

The point of the above is as follows: even though we may wish to match learning environment with CL, and create a "taxonomy of learners" of homogeneous CL categories, we still may have heterogeneous personality types within each CL grouping, and the personality-style effect may negate to some extent the effects of CL grouping. Even so, there exists some empirical evidence suggesting that the potential for confounding offered by grouping heterogeneous personality types into homogeneous CL groups may not be too serious. Aranya, Meir, and Bar-Ilan [1978], in an empirical study using the Holland framework, provided some evidence to show that at the freshmen level, students have to a certain extent selected courses that correspond to their personality types. In comparing freshman accounting and psychology majors, Aranya *et al.* [1978] found that the "conventional" environment implied by the accounting course seemed to attract more or less "conventional" personality types, whereas this was not so for the psychology course and its students.

Implications for Curriculum Design

Following from the notion of a taxonomy of learners based upon cognitive complexity, it seems apparent that the accounting instructor may use the structure of the learning environment as an independent variable so that the learning of both low and high CL students is enhanced, and the advancement of low CL students to higher levels is encouraged by the systematic withdrawal of structure over the term (or over the whole program). We offer the following example as an illustration of the implication of CL for accounting curriculum design for a single topic.

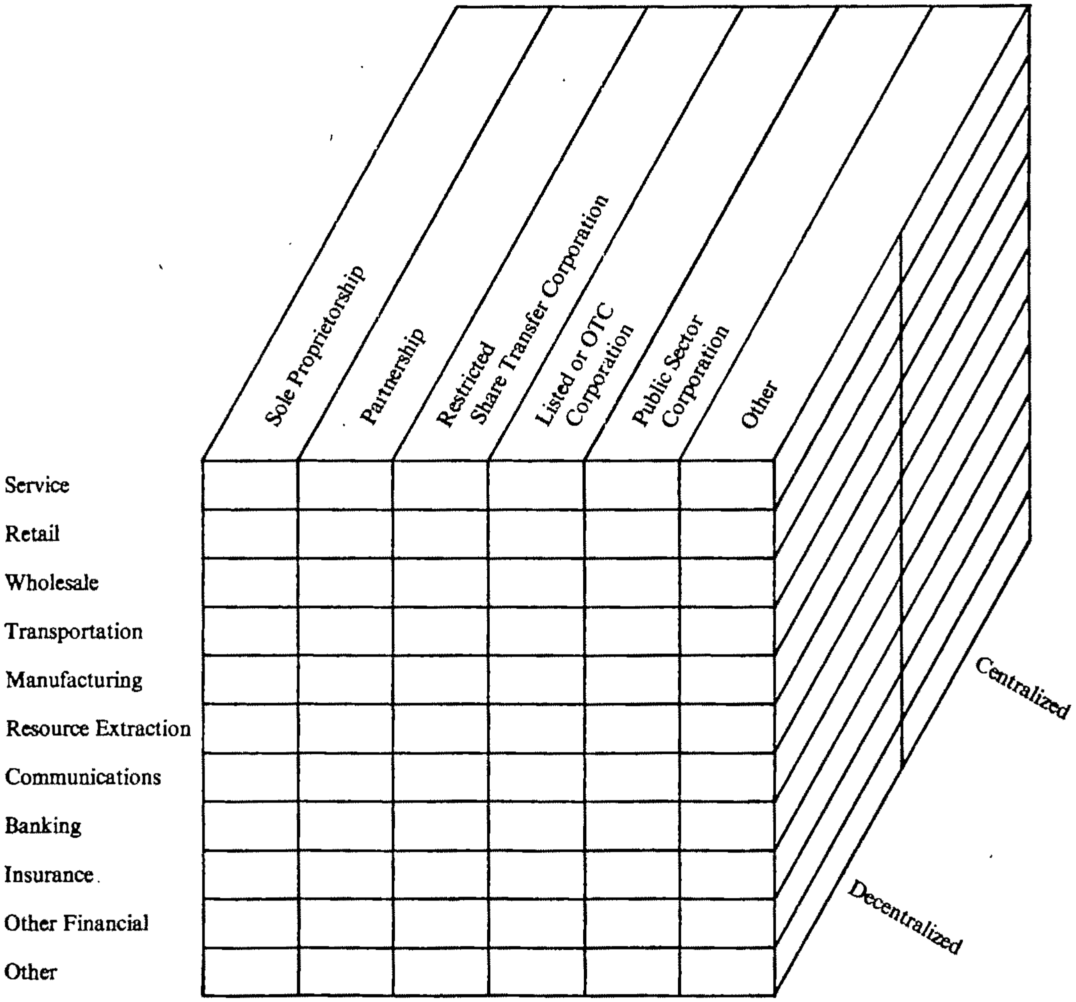
The concept of meaningful classification is one of the basic notions underlying much of accounting [AICPA, 1953]. Students are typically introduced to the classification notion by means of a chart of accounts early in their first course in accounting. Following from the discussion above, it seems reasonable that the low CL students should be given detailed rules, explanations, and examples of different charts of accounts for different types of organizations. Alternatively, the instructor could concentrate on only a restricted number of types of organizations early in the course, going through the entire accounting process with the simpler types first (*e.g.*, service and retail). Later on in the course, he could introduce other types, and therefore other charts of accounts. Thus, high structure would be provided, the learning environment in which low CL students evidently thrive.

For the high CL students, the instructor could provide descriptions of inputs, processes, organizational structure, and outputs for various types of organizations, and could then ask the students to derive meaningful charts of accounts for various purposes (such as control, financial statement reporting, *etc.*). Thus, relatively low structure would be provided. These students might then be able to generalize that the chart of accounts is a function of the specific organization's processes, structure, information needs, and cost. Specifically, the instructor wishing to provide little structure in teaching this topic might first present the "solid matrix of organizations" as in Table 3 to his students, then briefly lecture on the situational and functional specificity of the chart of accounts, and finally assign the following readings:

—"Accounting for a Drive-In Diner"
by San Lan Chan

TABLE 3

SOLID MATRIX OF ORGANIZATIONS



(Other dimensions may include profit-seeking versus non-profit seeking; national versus multinational; single product versus multi-product; *etc.*)

Each triplet in the above solid matrix suggests one set of inputs, processes and outputs, and thus one set of a chart of accounts to service the specific information needs of the organization.

—"Cattle Accounting" by John F. Loughlin

—"Reporting for United Fund Agencies" by Charles T. Farley, and

—"Nuclear Fuel Accounting" by William L. Ureel.

(All of these readings are from recent issues of *Management Accounting*, and are reprinted in Burns and Hendrickson [1976]). The students would then be required to prepare charts of accounts for each of these types of concerns for both control and external purposes.

Recognition by the instructor of the existence of CL and of a relationship between the accounting student's learning style (CL) and the structure of the learning environment is also important insofar as *formal* approaches to curriculum design are concerned. In both the accounting and education literatures, proposals for systematic approaches to curriculum design have recently appeared. For example, Buckley [1969] has proposed that curriculum methodology consists of the following formal steps:

1. Defining objectives.
2. Identifying and organizing subject matter types.
3. Selecting subject matter models.
4. Selecting instructional media.
5. Selecting the learning environment.
6. Evaluating the curriculum.

The CL concept can provide important guideposts at several stages in this methodology. For example, Buckley suggests that "specific, implementive behavioral objectives" are desirable—certainly the behavioral objectives should be part of the provision of sufficient structure for students operating at low CL in order to ready them for progression to higher CL. When discussing stages 2 and 3 of his framework, Buckley states [p. 391], "It is important to recognize and classify subject matter types because each type (and sub-type) may be learned more efficiently by using a particular instructional method. Discrete concepts . . . may be highly responsive to the linear program approach, while the case method may be a more appropriate vehicle for solving unstructured problems." The CL notion provides a means whereby Buckley's concept of matching instructional methods with subject matter types may be implemented with the individuality of groups of accounting students in mind. Indeed, the idea that different groups of accounting students require different levels of structure, *etc.* is an extension of Buckley's "paradigm—subject matter complex" model [pp. 392–393].

Extensions of the application of the CL concept to step 4 (selecting instructional media), step 5 (selecting the learning environment) and step 6 (evaluating the curriculum) are also easily made. The instructor's selection of instructional media (lectures, practice sets, audio-visual aids, *etc.*) and degree of structure in the learning environment "involves a search for, and the utilization of, the most effective delivery system for a particular learning experience" [p. 394]. One of the criteria which Buckley postulated might help in the selection of learning media was the "learning characteristics of the trainee" [p. 396]. CL makes explicit the aspects of these characteristics which might help the instructor in this stage of curriculum design.

The relationship between the cognitive complexity construct and formal models of curriculum design is thus important. CL enters the formal model at several points to help resolve decisions among alternative curriculum strategies facing the instructor, and in a way acts as an extension of the model by explicitly incorporating the specific needs of the individual accounting student.

Implication for Evaluating the "High-Structure, Low-Structure" Controversy

Within the framework of the interaction between the structure of the learning environment and the developmental aspect of cognitive level, there is no controversy, since both high structure learning environments and low structure environments are needed at some points along the CL developmental continuum to enhance the student's CL development (this is the "matching model" referred to by Hunt *et al.* [1974]; Perry [1970], and Fantini [1973]). But, exclusive use of one orientation throughout a student's university career apparently will not enhance the student's CL growth, so that his arrival at the highest CL stage may be retarded or permanently impaired. For example, use of unstructured cases exclusively or too early in the first course in accounting may lead to arrestation of the students' CL if (as is the case with many freshmen) they are operating at a relatively low CL level at this stage in their student careers.

Therefore, the onus of the continuing curriculum debate is misplaced. It is not high structure versus low structure, but rather a question of selecting high structure for certain students and low structure for other students, and knowing when and to what extent to modify structure so that the developmental goal of accounting education will be reasonably assured of being achieved.

SOME IMPLEMENTATION PROBLEMS

Both the above discussion of the implications of the CL concept, and Buckley's (and others) proposals for formal methodologies of curriculum design are, in a sense, idealizations. By this we mean that their use can never be completely achieved in practice—rather, they are potentially important tools of the accounting educator's repertoire. They are idealizations because, to a great extent, they implicitly assume away three very important constraints on curriculum; namely, existing institutional arrangements and relationships, the teaching style with which the individual instructor is most comfortable, and the previous experience of the students. The degree to which the implementation of a change in the approach to curriculum design is feasible depends to a great extent on these three factors.

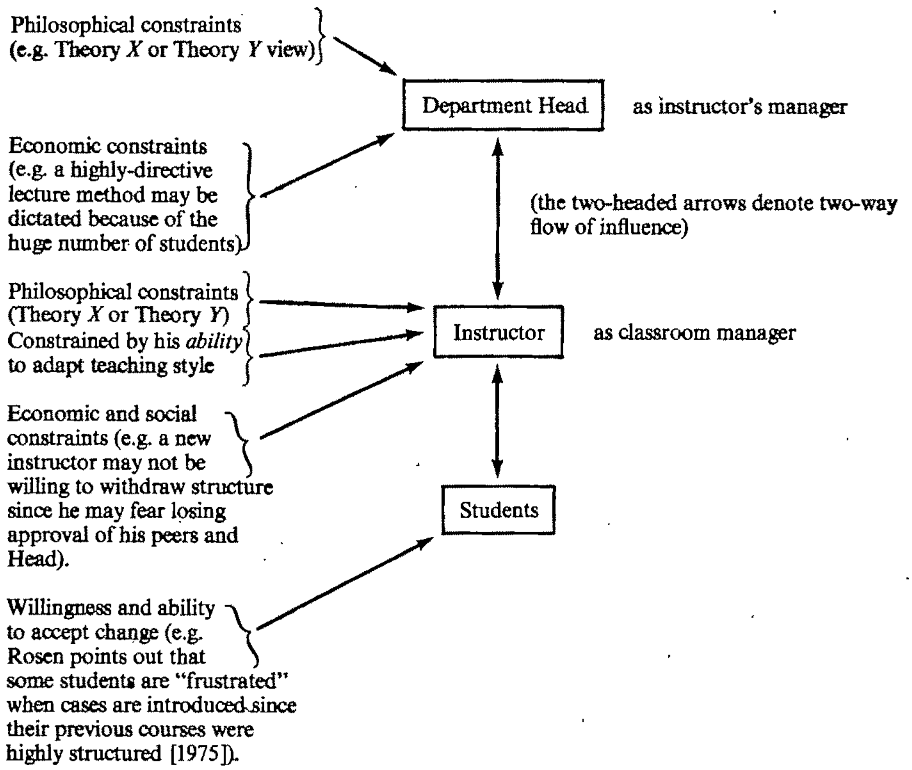
In Table 4, the relevant relationships bearing on the implementation issue are shown. The department head is viewed in Table 4 as the instructor's "manager," just as the instructor is responsible for "managing" the students. In a sense, the instructor is the "man in the middle"—his flexibility is constrained by both the apparent downward pressures on him from his department head and by the willingness of his students to accommodate to change. If the head and the instructor operate in a "Theory *Y*" type of environment [McGregor, 1960] then —subject to absolute constraints such as excessively large class sizes, *etc.*—implementation of a change in the approach to curriculum might be more easily effected. On the other hand, to the extent that the head views *his* role and the instructor's as that of an authority figure (Theory *X*), change could be much more difficult.

Even if a formal introduction of the CL notion into curriculum design is not feasible in a given situation, the mere fact that the instructor has been sensitized to the CL concept is important, since he can then at least modify his teaching role and thus the learning environment he creates, on an *ad hoc* basis.

Another implementation issue involves the degree to which there exists adequate techniques for measuring CL. The Paragraph Completion Method for measuring CL has been developed by researchers in education and psychology over the past several years to the point where it is a standard assessment method. Hunt [1974, p. 29] states, in referring to his empirical work; "[in] all of the experiments described, CL was assessed by means of a Paragraph Completion Method . . . [which] has been used with thousands of students, mostly from 12–18, over the past 15 years so that considerable construct validity, correlates, and normative evidence is available." The method is described in detail in Hunt *et al.* [1978], and requires at least two independent

TABLE 4

RELATIONSHIPS AND CONSTRAINTS IN THE TEACHING SITUATION


Philosophical constraints
(e.g. Theory *X* or Theory *Y* view)
Department Head
as instructor's manager
Economic constraints
(e.g. a highly-directive lecture method may be dictated because of the huge number of students)
(the two-headed arrows denote two-way flow of influence)
Philosophical constraints
(Theory *X* or Theory *Y*)
Constrained by his *ability* to adapt teaching style
Instructor
as classroom manager
Economic and social constraints (e.g. a new instructor may not be willing to withdraw structure since he may fear losing approval of his peers and Head).
Students
Willingness and ability to accept change (e.g. Rosen points out that some students are "frustrated" when cases are introduced since their previous courses were highly structured [1975]).

rater assessments of a student's CL. Mean inter-rater reliability for 26 published studies is $r=.86$ [Hunt, *et al.*, 1978]. For CL assessments on university students, Barker [1974] found an inter-reliability of 0.85. Halverson [1970] found 0.83, and Carr [1965] found 0.91. Other studies showed similar results. Insofar as reliability of the Paragraph Completion Method for assessing CL is concerned, Gardiner and Schroder [1972] reported a test-retest r of 0.67 for 36 college students over a three-month interval.

CONCLUSION

Accountants have recently become aware of the cognitive complexity construct as it appears in the psychological literature related to human information processing and have begun to apply the notion in the design of accounting information systems on an experimental basis. In the present paper, we view the formal educational setting of the accounting student as a sort of "information system" with given objectives and conclude that it is important to take CL into account in both the particular course design and the larger curriculum setting.

The cognitive complexity construct is well established in the empirical and theoretical literature of the education discipline. Using this education literature as an organizing framework, we conclude that, given certain reasonable goals of accounting education, the instructor's knowledge about the *existence* of the CL construct and its *level* in individual students, has implications for viewing accounting education as a developmental process and for "fine-tuning" learning environments for groups of accounting students.

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Lectures Versus Personalized Instruction: An Experimental Study in Elementary Managerial Accounting

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ABSTRACT: Few of the reported studies of innovative techniques for accounting education have found significant improvements in students' performance and attitude. This paper reports on an experimental study in an elementary managerial accounting class using an innovative teaching methodology, The Personalized System of Instruction (PSI). The PSI teaching method was selected for testing because studies in other academic disciplines had found that PSI classes performed better and had better attitudes than traditional lecture/discussion classes. The present study found significantly better performance and attitudes in PSI taught sections of an elementary managerial accounting class. The study also found a higher course drop-out rate for the PSI taught sections.

ACADEMIC accountants in general are strongly concerned with accounting education. Many individual accounting professors have evidenced this concern with independent classroom studies of educational methods. Reports of such studies can be found in the Education Research section of almost any issue of this journal. Commonly these educational studies involve a specific pedagogical technique or aid such as the use of a business game [DeCoster and Prater, 1973]; teaching machines [Streuling and Holstrum, 1972]; competency-based module [Smith, Taylor and Western, 1974]; audio-visual instruction [McNeill and Collins, 1975; Laughlin, Gentry and May, 1976]; utilization of small groups [Benis, Brody and Johnson, 1976]; differential scoring techniques [Pawliczek, 1977]. For the most part, these and other accounting education studies, *e.g.*, Pickett and Butts [1970], Glover [1970] and Daily [1969] reported a lack of significant improvements in students' performance and attitudes.

This paper reports on the favorable results found in an introductory managerial accounting course from the application of a set of teaching techniques called The Personalized System of Instruction (PSI). This set of techniques was originally described by Keller [1968], and has since been utilized and investigated at many colleges in a variety of disciplines [Sherman, 1974]. The major components of PSI are modulized course structure, written study materials, student self-pacing, student-peer proctors, competency-based testing and non-re-

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quired lectures.

The PSI method has been used over the past three years in an introductory managerial accounting class at Oregon State University. The course material was divided into ten separate modules covering standard managerial accounting topics. For each module, students were provided with a written study guide. The purpose of the study guide is to enable the student to have constant access to the course study materials. For each learning module these materials consisted of a set of behavioral learning objectives, a reading assignment, study questions for the student to answer while completing the reading assignment, a list of required problems, a list of recommended problems, and any comments, formulas, or examples the instructor desired to add to a particular topic.

The required and recommended problems were designed to provide practice and to serve as a self-test for the student to determine whether the learning objectives for a particular accounting concept or technique had been accomplished. Students had access to problem solutions in the classroom during scheduled class periods. The problems were not formally graded; however, the required problems had to be satisfactorily completed before the student was allowed to take a module examination.

Individual students proceeded through the course at their own pace. The only constraint was that the course grade at the end of the term depended upon the number of points the student had accumulated from module examinations.

The proctor's role has been seen as primarily one of an on-the-spot grader [Keller, 1968]. In this study the proctors also served as tutors, assisting students with the required and recommended problems, study questions, and other questions on the reading.

PSI courses use a mastery criterion. Usually a student is required to achieve a given percentage score (up to 100 percent) on a module examination before proceeding to the next module. A variation of the mastery criterion was used in this managerial accounting course. Since the course topics were relatively independent, equal mastery of all topics was not necessary. Three examinations were prepared for each topic. The examinations included multiple choice questions, problems, and short essays. Therefore, a student had as many as three opportunities to achieve a desired level of mastery for each module. To encourage maximum study of each module, the best examination score for every module was used in determining the final grade. That is, there was never a penalty for retaking an examination, since only improvements were counted. Most students used one of the standard grade requirements (A = 90 percent, B = 80 percent, C = 70 percent, D = 60 percent) as their self-imposed mastery criterion in deciding whether to repeat a module.

Self-pacing and the desired reliance upon written materials precludes the requiring of lectures in a PSI course. However, non-required lectures may be used for enrichment purposes and to stimulate interest in the subject area. In some cases, a student must have reached a particular module in order to attend the lecture. At other times, the lectures may have no specific bearing on a given module. In the PSI sections the scheduled class periods were utilized exclusively for studying, for individual student interactions with the instructor or a proctor, and for examinations. No group lectures were given to the PSI classes.

THE EXPERIMENTAL STUDY

The PSI teaching method at Oregon State University has been more fully described in a previous report [Bailes, 1975]. That report included a *post hoc* analysis of relative student attitudes and examination performance for introductory managerial accounting classes taught with the PSI method compared to other managerial accounting classes taught via the traditional lecture/discussion method. The analysis indicated that students in the PSI classes scored higher on common examination questions and had more positive attitudes toward the course. Based on that analysis, plus reports from other academic disciplines [Kulik, Kulik and Carmichael, 1974; Taveggia, 1976], the following null hypotheses were constructed for testing in a controlled experimental design.

Hypothesis 1: No significant difference will be found between the performance of PSI students and lecture students on the same final examination.

Hypothesis 2: At the end of the term there will be no significant difference between the attitudes toward the course of PSI students and lecture students.

The Design

The experiment was conducted during a spring term. The managerial accounting class was the second course of a two term principles sequence. It was a sophomore level, multiple-section course with computerized registration. Students could indicate an instructor preference in registration but could not transfer class sections once they were assigned. The experiment involved four class sections and two instructors in a two-by-two (instructor × teaching method) factorial design. Each instructor taught one PSI and one lecture section. At the first class time one instructor taught a PSI section, and the other instructor taught a lecture section. At this point there was a random assignment of the teaching method. At the subsequent class time the two instructors reversed their teaching methods. The time scheduling of the sections controlled for time-of-day effects, such as those found by Tennant and Lawrence [1975].

Both instructors agreed in advance upon a single course outline. That is, all sections had the same reading and problem assignments. The instructors also agreed upon a set of learning objectives for each course topic. The PSI students received these objectives as a part of their written handout materials. In the other class sections the lectures were structured around the agreed upon learning objectives.

The PSI students took topic examinations on a self-paced basis. The lecture students had three mid-terms. At the end of the course, a common final examination was administered to all of the sections at the same time. All of the examinations were written jointly by the two instructors. In addition, the same types of questions and question formats were used on all of the examinations. The final examination was comprehensive of the entire course. It was required and comprised 25 percent of the course grade for all of the students.

At the beginning and at the end of the term, all students were asked whether or not they would recommend this course to a friend. In addition, at the end of the term the students were asked to indicate the strength of their recommendation using a seven-point rating scale.

RESULTS AND ANALYSIS

Hypothesis 1

This hypothesis implied that the teaching method would not affect students' scores on their final examination. The mean examination scores for each of the four classes are shown in Table 1. For both instructors the PSI taught class had a higher mean final examination score than the lecture taught section. The combined mean of the two PSI sections was 62 (possible = 75), compared to a combined mean of 56 for the two lecture sections.

TABLE 1

FIELD EXAMINATION SCORE MEANS

	PSI	*Lecture*
Instructor 1	62	57
Instructor 2	61	56

A 2 × 2 analysis of variance using the SPSS subprogram ANOVA [Nie, *et al.*, 1975] was performed to test for the significance of the difference among the final examination results of the four class sections. The results of this analysis are shown in Table 2.

As can be seen from Table 2, one statistically significant effect was found. The F-ratio for the main effect, Teaching Methodology, was 8.856 with one degree of freedom. This was significant at the .003 level. Therefore, Hypothesis 1 was rejected; teaching methodology was related to the students' performance on the final examination. Based on the relative mean scores for the two teaching methods, the PSI method was more effective than the lecture method. As shown by the other main effect and the two-way interaction, this result was independent of the instructor.

Hypothesis 2

During the first class session all of the students were asked to give a "yes" or "no" answer to the question "Would you recommend that a friend take this course?" This question was used to indicate whether a student had a prior positive or negative attitude toward the course. As can be seen from Table 3, the data yielded a chi-square of .088. With one degree of freedom, this value for chi-square was not significant at the .70 level. There was no significant difference in the response patterns of the PSI and lecture groups to the course recommendation question at the beginning of the term.

TABLE 3

COURSE RECOMMENDATION BEGINNING OF TERM

	Recommend	*Not Recommend*
Lecture	44	45
PSI	47	44
	$X^2=0.088$ (N.S.)	

At the end of the term, all of the students were given the same course recommendation question they received on the first day. In addition, they were given a second question which asked them to

TABLE 2

FINAL EXAMINATION ANALYSIS OF VARIANCE

Source of Variation	*Sum of Squares*	*Degrees of Freedom*	*Mean Square*	*F Ratio*	*Significance of F Ratio*
Main Effects	993.627	2	496.813	4.487	.013
Instructor	14.299	1	14.299	.129	.720
Teaching Methodology	980.614	1	980.614	8.856	.003
2-Way Interactions	6.516	1	6.516	.059	.809
Instructor/Teaching Methodology	6.516	1	6.516	.059	.809
Explained	1000.142	3	333.381	3.011	.033
Residual	14172.873	128	110.726		
Total	15173.015	131	115.825		

rate the strength of their response on the following seven-point scale:

1 = strongly recommend
2 = recommend
3 = slightly recommend
4 = neutral
5 = slightly not recommend
6 = not recommend
7 = strongly not recommend

Tables 4 and 5 show the course recommendation results at the end of the term.

TABLE 4

COURSE RECOMMENDATION END OF TERM

	Recommend	*Not Recommend*
Lecture	43	30
PSI	51	9
	$X^2 = 10.7, P < .01$	

From Table 4 it can be seen that the data yield a chi-square of 10.7. With one degree of freedom, this chi-square value was significant at the .01 level. Therefore, at the end of the term a significantly greater proportion of the students in the PSI class had a positive attitude toward the course as indicated by their favorable recommendation.

TABLE 5

STRENGTH OF COURSE RECOMMENDATION MEANS

	PSI	*Lecture*
Instructor 1	2.44	3.45
Instructor 2	3.00	3.85

The strength of the course recommendations is shown in Table 5. This table shows the mean recommendation score for each class. The lower mean recommendation scores in the PSI classes are taken to indicate a more positive attitude towards the course relative to the lecture sections. The significance of this difference was tested by an analysis of variance, as shown in Table 6. The analysis of variance showed a highly significant main effect for Teaching Methodology. The second hypothesis stated that students in the PSI and lecture classes would not differ in their attitude towards the course at the end of the term. The analysis depicted by Tables 4 through 6 indicate that Hypothesis 2 should be rejected.

Interpretation of Results

The analysis of the data led to the rejection of the two null hypotheses. The mean scores for examination performance and student attitude were highest for the PSI sections. This suggests that the PSI teaching method is more effective than the lecture method. There are several reasons why this might be expected. There are, in particular, two aspects of the PSI method which seem particularly

TABLE 6

COURSE RECOMMENDATION ANALYSIS OF VARIANCE

Source of Variation	*Sum of Squares*	*Degrees of Freedom*	*Mean Square*	*F Ratio*	*Significance of F Ratio*
Main Effects	35.826	2	17.913	7.348	.001
Instructor	7.287	1	7.287	2.989	.086
Teaching Methodology	28.698	1	28.698	11.773	.001
2-Way Interactions	.218	1	.218	.089	.766
Instructor/Teaching Methodology	.218	1	.218	.089	.766
Explained	36.043	3	12.014	4.929	.003
Residual	312.017	128	2.438		
Total	348.061	131	2.657		

important. First, the PSI method provides for more direct contact between the instructor and the individual student. This means that the instructor can concentrate on the specific problems of each student, whereas in a lecture class the students are most often addressed as a group. Secondly, PSI allows students to retake topic examinations. This gives them more frequent opportunities to learn from their mistakes. At the same time, the additional examination opportunities should motivate increased learning without increasing examination pressure.

Based on this single study, it is only possible to make tentative inferences about the effectiveness of PSI for teaching introductory managerial accounting. The method should be further tested with different instructors, students, and textbooks. Furthermore, there was an unexpectedly high attrition rate found in the PSI sections of this study. Table 7 shows the class sizes at the beginning and the end of the term. The course drop-out rate was 18 percent in the lecture sections and 33 percent in the PSI sections.

TABLE 7

CLASS SIZES BEGINNING OF TERM: END OF TERM

	Lecture	*PSI*
Instructor 1	47:40	46:33
Instructor 2	42:33	45:28
Total	89:73	91:61

A *post hoc* analysis of this differential drop rate showed that the drop-out rate during the first half of the term was nine percent for the lecture classes and 23 percent for the PSI classes. During the last half of the term, however, the respective drop-out rates were nine percent and 10 percent.

This study did not collect data to indicate why the PSI classes had a higher drop-out rate at the beginning of the term. Since the students did not know that they were registering for a PSI section, it is possible that some of the drop-outs were students who did not like the idea of a self-paced class and dropped without giving it a try. Another possibility is that the high early drop-out rate was a direct result of the PSI method. That is, more students disliked the method, or they were not doing well using the method. This last possibility is considered to be unlikely as the partial-grade records showed that most of the drop-out students had passing topic-examination scores, and several had topic-examination scores that would have met the "A" or "B" criteria.

The uncertainty over the drop-out rates increases the tentativeness of the conclusion that the PSI method produced more favorable course attitudes than the lecture method. It is possible that in the PSI sections, the higher drop-out rate reduced the relative proportion of students who would not have recommended the course.

It is also possible that course drop-outs could have affected the relative final examination performance by altering the average ability of the classes. This possibility was investigated by comparing the mean overall grade point average for the lecture and PSI students, and by comparing their mean grades for the first course of this two course sequence. These data are shown in Tables 8 and 9. Both

TABLE 8

OVERALL GRADE POINT AVERAGES

	$\bar{X}$	S^2	N
Lecture	2.78	.19	73
PSI	2.87	.24	59

TABLE 9
FIRST ACCOUNTING COURSE GRADES

	$\bar{x}$	S^2	N
Lecture	2.51	.68	72
PSI	2.59	.60	58

of these measures of student ability show higher means for the PSI students. However, in both cases a t-test for difference between means was not significant at the 10 percent level. That is, as measured by both overall grade point average and first accounting course grade, there was no significant difference in the average ability of lecture and PSI students at the end of the term. For this reason it is unlikely that the higher PSI drop-out rate was responsible for the superior PSI final examination performance.

SUMMARY

A controlled experiment was designed to test the relative effects of two teaching methodologies on learning effectiveness and student attitudes in an introductory managerial accounting course.

Learning effectiveness was measured by student performance on the course final examination. Students in the PSI teaching method classes scored significantly higher on the final examination than students in the conventional lecture teaching method classes. This finding is consistent with findings reported in other academic disciplines.

Student attitudes were measured by whether the student would recommend the course to a friend, and the strength of the recommendation. At the beginning of the term, there was no significant difference in the proportions of the lecture or PSI classes that would recommend the course in introductory managerial accounting. At the end of the term, a significantly higher proportion of students in the PSI classes recommended the course. In addition, the PSI sections showed a significantly more positive result when asked to make their recommendation on a seven-point scale ranging from strongly recommend to strongly not recommend. This result was also consistent with previous *post hoc* data analysis for this course, and consistent with published reports from other academic areas.

An unexpected finding was a higher course drop-out rate in the PSI classes. The differential was found to be due to a high PSI drop-out rate at the beginning of the term. Over the last half of the term, the drop-out rates were equivalent for lecture and PSI classes.

This study has shown the potential benefits to accounting education that can be achieved through alternative instructional methods, where such methods involve a coordinated set of pedogogical techniques developed and tested in other academic disciplines. The results of this study are tentative. They do suggest, however, that those interested in improving accounting education should examine such developed methodologies as PSI.

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An Admission Test for Intermediate Accounting

Patrick R. Delaney, David E. Keys, Curtis L. Norton and John R. Simon

ABSTRACT: This article describes the results obtained when an admission test was developed and used at Northern Illinois University as an accept-reject device for our first intermediate accounting course. The results indicate that it is possible to develop an admission test, that the test need not be lengthy, and that acceptable levels of correlation exist between the admission test scores and success or failure in the first intermediate accounting course.

The twin problems of increasing enrollments and shortages of qualified faculty are common to many accounting departments. Taken together, these two problems indicate accounting educators may not be able to provide a quality education for all those wishing to major in accounting. The problems are difficult and complex, but several approaches have been suggested to deal with the issues. Among the suggested approaches are (1) increasing faculty size, (2) increasing class sizes, (3) implementing retention standards, and (4) implementing admission standards [Clay and Mann, 1976]. For most accounting departments, the modification of admission standards seems to be an acceptable and promising alternative (often used in conjunction with other measures). Admission tests can be used as a form of admission standard.

The move to professionalization of the accounting curriculum may precipitate admission tests. The first admission and retention standard stated in the Final Report of the Board on Standards for Programs and Schools of Professional Accounting is [AICPA, 1977, p. 6]:

> Students selected for admission to a professional program shall show a high probability of success in the study of accounting.
>
> Entrants . . . should have completed at least two years of pre-professional education with a grade point average indicative of potential success . . . and should have received a satisfactory score on a suitable admission examination

Previous research [McCormick and Montgomery, 1974; Buehlmann, 1975; and Frakes, 1977] has shown reasonable levels of correlation between tests given prior to entry in intermediate level accounting and the students' scores in the first intermediate accounting course. For the most part, the authors of the previous research have envisioned the use of pre-intermediate tests as counseling devices to be used as predictors of students' success in the intermediate course. McCormick and Montgomery [1974] and

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Buehlmann [1975] both stated the AICPA Level I tests were used in that manner at the schools involved in their research.

The purpose of this article is to suggest that admission tests other than the AICPA Level I tests can be developed and to indicate the results obtained when an admission test was developed and used at Northern Illinois University (NIU) as an admission standard, *i.e.*, not only a counseling tool but also as an accept-reject admission device. Readers may wish to contrast the results presented in this article with the AICPA Level I test results and results of another pre-intermediate test [Frakes, 1977]. It is difficult to generalize across studies, but the information contained herein may be useful to other accounting faculties considering steps to limit enrollment and/or increase quality.

BACKGROUND

At NIU, students enter Accounting Principles I (financial) and Accounting Principles II (managerial) in their sophomore year. The first intermediate accounting course is taken in the junior year. NIU has a fairly large number of transfer students (40–50 percent) and the accounting background of the transfer students tends to vary greatly. Most of the transfer students are from junior or community colleges. Students at such institutions normally take Principles I and II as freshmen and in some cases both courses stress financial accounting. Some of the transfer students take a cost accounting course in their sophomore year before arriving at NIU, but many do not. As per agreement between two-year and four-year schools in Illinois, NIU grants transfer credit for cost accounting. Except for unusual cases (approximately two–four students per year), NIU does not grant transfer credit for intermediate accounting courses taken at two-year institutions.

The Accountancy Department at NIU has chosen to adopt both admission and retention standards (over and above the standards of the College of Business). The retention standards are important in maintaining the level of quality education we deem appropriate but are not the focus of this article.[1] Alternative admission standards considered were minimum grade point average (GPA), AICPA Level I test, and a test designed by the NIU accountancy department.

Clay and Mann [1976] have indicated that GPA standards are the most common means used to establish admission standards to intermediate accounting. Interestingly, there is little research available which demonstrates that past GPA is a good predictor of students' ability to master the intermediate accounting course. GPA is probably chosen for pragmatic-political reasons, not on the basis of empirical observation. GPA was not used by NIU because of the difficulty of obtaining GPA for all students and the problems of comparison of the GPA of transfer versus non-transfer students.

The AICPA Level I tests have been shown to be good predictors of success in the intermediate accounting course. McCormick and Montgomery [1974] found the correlations between the intermediate accounting grade and Level I Form ES and Form DS to be .50 and .40, respectively, for the students at Florida Atlantic University. Buehlmann [1975] found the correlation between success (A, B, C grades) or failure (D, F, or withdrawal) in intermediate accounting and the AICPA Level I Form FS score to be .497 for students at Illinois State University. In spite of the previous research, the AICPA Level I test was not chosen for use at NIU. The Level I test contains both financial and managerial questions. Some of the NIU transfer students have no managerial accounting background, while others have had cost accounting. It was felt that it would be unfair to decide admission or non-admission on the basis of questions to which the potential accounting majors had received uneven exposure.

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[1] NIU's retention standards include the following two policies:

1. A student is permitted to enroll in accountancy courses above the principles level a maximum of two times;
2. A student must earn a grade of "C" or better in each accountancy prerequisite course.

The remaining alternative was to develop the departments own examination as an admission test. Accordingly, a two-part test was drafted. Part I consisted of 55 multiple choice questions covering financial accounting topics. Part II contained 33 multiple choice questions covering managerial accounting topics. The intent was to use Part II as a counseling tool to advise students of their ability to master the cost accounting course, and use Part I as an accept-reject decision for intermediate accounting. In designing the test instrument, every attempt was made to develop questions that were not dependent upon any particular principles textbook. The questions in Part I were designed to test the student's comprehension of the concepts of asset and liability, the recording of transactions, the accrual accounting process including adjusting and closing entries, and financial statement presentation and analysis. In most cases the questions were analytical and/or computational in nature, rather than definitional.

A previous study has indicated that pre-intermediate tests have some predictive ability. Frakes [1977] developed a test of four specific aspects of introductory accounting and tested University of Washington (U.W.) and Washington State University (W.S.U.) students. When the test results were used in a regression equation including eight control and demographic variables (grade in the intermediate course as the dependent variable), the correlation coefficients were significant for three of the four specific test aspects for the U.W. sample, but for only one of the four aspects in the W.S.U. sample. The results seem to indicate that correlation between pre-intermediate test results and intermediate accounting scores are situation-dependent. Frakes [1977, p. 209] recommended that demographic variables should be considered for use in prediction equations developed for admission decisions. While we agree that the correlations may be situation-dependent, we are skeptical of the feasibility of using demographic variables if the prediction equation is to be used for more than a counseling device. The eight variables Frakes found useful included age, sex, and marital status. Obvious problems would develop if these variables were used in a manner that was perceived as discriminatory.

RESEARCH RESULTS

The admission test was given to all 322 students who applied for admission to the first intermediate accounting course for the fall, 1976, semester. Thirty-six students of that sample received scores that were considered unsatisfactory and were asked to retake the first principles course before attempting intermediate accounting. The score used to determine satisfactory or unsatisfactory performance was well below the "optimum" cutoff score (see the section on Advantages of an Admission Test). Thus, 286 (322 less 36) students took the admission test *and* the first intermediate accounting course. These students received grades of A, B, C, D, F, or W for withdrawal.

The task of analyzing the predictive

accuracy of a pre-intermediate test is much more difficult if the test has been used as a cutoff device rather than a counseling device. It is possible to develop correlations between the students' scores on the admission test and performance in the intermediate course but only for the (286) students who actually took both. Any correlations developed are biased because we are unsure how the other 36 students would have fared had they been allowed to attempt the intermediate course. Accordingly, the biased correlations will be discussed first and then a means of approximation will be presented to determine the degree of bias.

Table 1 shows the degree to which success or failure of the 286 students was correlated with a series of variables. Success was defined as A, B, C; failure as D, F, W in the course. The variables tested were:

1. FIN SCORE = The number of questions answered correctly on the financial section (Part I) of the admission test (55 possible).
2. ELI GRADE = The grade students received in the first principles course.
3. EL2 GRADE = The grade students received in the second principles course.
4. NIU or TRN = Whether or not the student was a transfer student.
5. SEX = Male or Female.
6. MAN SCORE = The number of questions answered correctly on the managerial section (Part II) of the admission test (33 possible).
7. TOP 38 SCORE = The number of questions correct out of the best 38 questions on the financial section (Part I) of the admission test. The best 38 questions were selected by examining the profile analysis provided by the computer on the results of each question.

TABLE 1

CORRELATIONS OF PERFORMANCE IN INTERMEDIATE ACCOUNTING WITH SELECTED VARIABLES*

Variable	*Correlation Coefficients*
FIN SCORE	.525
TOP 38 SCORE	.523
MAN SCORE	.434
EL 2 GRADE	.309
EL 1 GRADE	.269
NIU or TRN	.171
SEX	.031

* Number of observations = 286.

The correlations presented in Table 1 allow several observations. First, if one of the variables tested must be chosen as an admission standard, the financial section of the admission test shows the most promise. The correlation between FIN SCORE and success or failure in the first intermediate course is .525. The correlation of the TOP 38 SCORE and success or failure is .523. The small difference between FIN SCORE and TOP 38 SCORE indicates the admission test need not be overly lengthy. A shorter examination is capable of providing nearly the same prediction. Second, the ability of the financial section of the admission test to predict success or failure compares favorably with the results obtained by McCormick and Montgomery [1974] and Buehlmann [1975] when they used the AICPA Level I tests, and with the results obtained by Frakes [1977] when he developed a pre-intermediate test. (The reader is again cautioned about the possible lack of generalizability and comparability.) Third, the correlations of the second principles course (managerial) and the MAN SCORE with success or failure in intermediate accounting were .309 and .434 respectively.

TABLE 2

STEPWISE REGRESSIONS OF SELECTED VARIABLES AND PERFORMANCE IN INTERMEDIATE ACCOUNTING

Regression 1: Variables 1–6			*Regression 2: Variables 2–7*		
Variables	*Multiple Correlation*	*F Values*	*Variables*	*Multiple Correlation*	*F Values*
FIN SCORE	.525	*34.67	TOP 38 SCORE	.523	*36.16
EL 2 GRADE	.562	* 9.63	EL 2 GRADE	.562	* 9.63
MAN SCORE	.574	* 6.53	MAN SCORE	.577	* 7.74
EL 1 GRADE	.575	.45	EL 1 GRADE	.578	.39
NIU or TRN	.576	.12	NIU or TRN	.579	.32
SEX	.576	.03	SEX	.579	.01
Number of observations=286			Number of observations=286		

* Significant at the .01 level.

This would seem to indicate that a knowledge of managerial accounting topics is helpful for the study of intermediate accounting. While this may be surprising, Buehlmann's study [1975, p. 94] also indicated that the score in the second principles course is important in explaining success or failure in intermediate accounting.

Two stepwise multiple regression equations were developed with the variables. In the first, regression variables numbers 1–6 above were the independent variables and success or failure the dependent variable. The order the variables entered the equations, the multiple correlation, and the F values in the final equation are presented in Table 2. Because the TOP 38 SCORE variable is derived from the FIN SCORE variable, a second stepwise regression equation was developed using variables 2–7. The results of that regression are also presented in Table 2.

The combined multiple correlations (R) for the final steps of the two regression equations were .576 and .579, indicating the need for additional explanatory variables. The additional variables needed to develop a full explanation of students' performance may well be demographic variables, similar to those previously suggested by Frakes [1977]. Nevertheless, the regression equations serve to complement the observations made after the correlation analysis (Table 1). In both regressions the score on the financial section of the admission test was the first variable to enter. FIN SCORE (TOP 38 SCORE) explained .525 (.523) of the variation in the dependent variable. The addition of other variables caused relatively small increases in the explanatory power. The second variable to enter both regressions was EL 2 GRADE, the grade in the second principles course, which increased the multiple correlation to .562 in both cases. The MAN SCORE was the third variable to enter the equations, followed by EL1 GRADE, NIU or TRN, and SEX. The latter three variables showed little usefulness as explanatory variables when used jointly with FIN SCORE or TOP 38 SCORE.

As indicated earlier, the correlations presented in Table 1 are biased because 36 students took the admission test and were not allowed to take the intermediate course. We believe the correlations are understated. As a rough approximation of the degree of misstatement, we developed a set of regression equations including the 36 students and assuming all 36 would have failed the intermediate course. The correlations developed on the basis of 322 students (previous 286 plus 36) are presented in Table 3 and should be contrasted with those in Table 1. The modified correlations would indicate the admission test is a better predictor than previously indicated.

TABLE 3

CORRELATIONS OF PERFORMANCE IN INTERMEDIATE ACCOUNTING WITH SELECTED VARIABLES*

Variable	*Correlation Coefficients*
FIN SCORE	.630
TOP 38 SCORE	.629
MAN SCORE	.547
EL 2 GRADE	.349
EL 1 GRADE	−.067
NIU or TRN	.281
SEX	.042

* Number of observations = 322.

The approach used here seems justified because the scores of the 36 students were quite low; well below the optimum cutoff. We feel the low scores indicate deficiencies and our experience leads us to believe the students would have failed, had they entered intermediate accounting. To substantiate our belief we have profiled the academic record of the 36 students. Those students were all asked to retake the Principles I course before attempting intermediate accounting. Of the 36, only 14 successfully completed Principles I and entered the intermediate course. Of that group of 14, only three received a grade of C or better (two C's, one B). Consequently, we believe there is support for including the 36 students among those students who failed.[2]

Admittedly, the bias correction presented is at best a rough approximation. The "true" correlations are somewhere between those in Tables 1 and 3. It is not possible to find the true correlations and the inability to develop complete ex-post validation may be a problem inherent in tests used as admission standards.

ADVANTAGES OF AN ADMISSION TEST

Discriminant analysis provides a useful means to assess the "optimum" cutoff and we have developed simple discriminant functions for the data in this study. For the two-group case, the application of discriminant analysis and regression analysis is identical [Anderson, 1958]. Thus, the discriminant analysis does not provide new insights, but discriminant packages normally give a clearer indication of the prediction for each student and highlight the errors in prediction.

We applied the discriminant functions to the 286 students. The two groups were "succeed" or "fail," and the only independent variable was TOP 38 SCORE. The default values were used for the prior probabilities. The least number of errors (best cutoff) occurred at a score of 21 correct of 38 questions. At that level, 64 errors in classification would have occurred: failure would have been predicted for 29 students who did succeed in intermediate (type I error), and success would have been predicted for 35 students who failed in intermediate (type II error).[3] The other independent variables were added to the discriminant functions but did not decrease the total error rate significantly.

We believe that a type I error is more serious than a type II error. We would rather allow a student to try and fail than not allow the student a chance. Therefore, the cutoff has been maintained at a level below the optimum. Our subjective judgments actually represent our intuitive feelings about the costs of misclassification and could be incorporated more formally into the discriminant analysis by an adjustment of the prior probabilities. [Cooley and Lohnes, 1971].

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[2] The values given in Table 3 were also substantiated by testing done prior to the fall, 1976, semester. In the spring, 1976, semester the admission test was given to all students entering intermediate accounting but the results were not used to exclude any students. For that pilot test group, the correlation between FIN SCORE and success or failure in intermediate was .625 [Moncada, 1976].

[3] The type I error may be understated because of the 36 students who were not allowed to enter intermediate.

An important advantage of an internally developed admission test is its flexibility. We feel it is necessary to have an admission test that is adaptable to the needs of each accounting department in order to prevent becoming "locked in" to an outmoded standard. An internally developed admission test is flexible in two ways. First, the test questions can be monitored constantly to ensure they remain applicable and relevant. Questions may be added or deleted as changes in principles level accounting topics occur. Our admission test began with 55 questions, but we used fewer questions as we gained more experience with the validity and accuracy of those questions. Second, an admission test provides flexibility because it allows a department to modify the minimum acceptable score to meet its needs. We began with a very low cutoff, seeking to identify those students who were clearly unprepared for intermediate accounting. As we gained more experience with the test instrument, the cutoff has been raised to assist us in addressing the increasing enrollment and faculty shortage problems.

PROBLEMS

There are at least three major problems encountered when using an admission test. First, it is possible that the admission test is a good predictor of success or failure in intermediate accounting because it is used as an input into the determination of the grade in the intermediate course. For example, if a teacher has knowledge of a student's admission test score, that knowledge might influence the decision to give a "C" versus a "D." This automatically would cause some correlation between the test score and the grade. We did not find any evidence of this occurring at NIU.

Second, the administration of the test and the necessary record-keeping can be somewhat time consuming. In our case it is necessary to alert all students that a test is required, and this is no small task when the students include transfer students, graduate students, and non-accounting majors. The record-keeping is much more difficult if the cutoff score is changed from year to year. It is necessary to keep a record of each student's score and the date the student took the admission test. The cooperative effort of the admissions office, testing services office, registrar's office, computer center, and accounting department is essential in the administration of the test.

Third, Clay and Mann [1976, p. 358] indicated that negative reactions of the other disciplines in the business school is a potential problem. Students who do not score well on the accounting admissions test may seek to transfer to other business disciplines. These departments may not react favorably if they must accept students the accounting department feels are marginal. We would add that there is also the possibility of negative reaction on the part of students. At present, NIU is one of only a few schools to use an admission test. It is possible that students may opt for an accounting major at some other school which does not require an admission test.

SUMMARY AND CONCLUSIONS

It is difficult to maintain a quality level of education when confronted with increasing accounting enrollments and a shortage of qualified accounting faculty. NIU has addressed these problems by developing an admission test for all students prior to entry into intermediate accounting.

The results of this study indicate it is possible to develop an admission test, that the test need not be lengthy, and that reasonable levels of correlation exist between the test scores and success or failure in intermediate accounting. The AICPA Level I tests also show reasonable levels of correlation, but we feel there are unique advantages to an internally developed admission test.

Finally, accounting faculty need to be reminded that admission standards do not guarantee quality education. There may be a tendency to assume that once an admission test is established, other measures are unnecessary. It is to be hoped that the admission standards allow a department to attract capable students, keep class sizes at reasonable levels, and establish an atmosphere conducive to learning. However, the quality of the accounting education will still depend upon the content of the courses and the quality and dedication of the faculty.

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A Flowchart Analysis of the Federal Income Tax Concept of Earnings and Profits

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ABSTRACT: The tax concept of earnings and profits is a complex and little understood subject. Part of the complexity can be explained by (1) the concept of earnings and profits is not well-defined in the tax law, and (2) its components are spread throughout the Internal Revenue Code. This paper presents a flowchart approach to analyze and integrate the essential elements of earnings and profits of corporate taxpayers for determination of the taxability and character of corporate distributions to shareholders. The flowcharts should be useful in helping students and professional accountants understand this concept.

ONE of the most complex and least understood concepts of the Internal Revenue Code of 1954 (Code) is that of earnings and profits. Yet, proper determination of earnings and profits is crucial in ascertaining the correct tax treatment of corporate distributions to shareholders with respect to their stockholdings. To the extent that the corporation has either current or accumulated earnings and profits, any distribution of property (other than stock or stock rights and liquidating distributions) will be taxed to recipient sharedholders as a dividend (*i.e.*, ordinary income). However, if a distribution to shareholders exceeds the corporation's current and accumulated earnings and profits, such distribution will be treated as a return of capital. In this case, shareholders will receive such distributions tax-free to the extent of the adjusted basis of their stock in the corporation and will have capital gain on the amount of distribution that exceeds the adjusted basis. Thus, it is imperative to have a basic understanding of this concept.

The purpose of this article is to present through the use of a flowchart an overview of the ingredients which enter into the computation of earnings and profits. Since the various components of earnings and profits are spread throughout the Code, this flowchart approach is especially helpful for students who are studying this complex subject. It should also be helpful as a general guide for the tax professional.

SIGNIFICANCE OF EARNINGS AND PROFITS

The federal income tax is an income tax and not a tax on capital. Thus, a corporate distribution[1] which represents

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[1] For the sake of brevity, all references in this paper to distributions will be deemed distributions of cash or property to shareholders with respect to their stockholdings which are not liquidating distributions.

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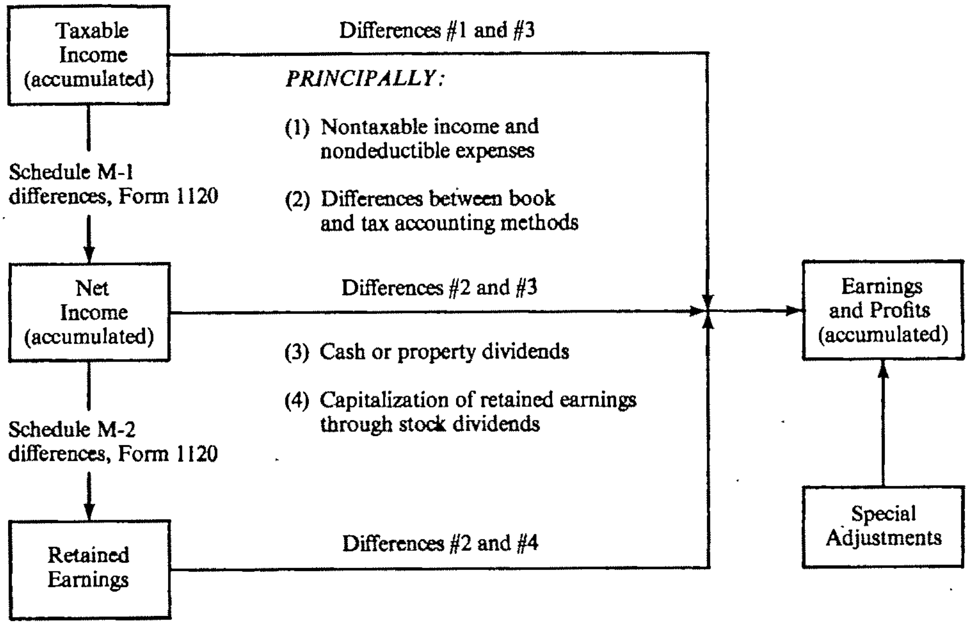
a return of invested capital should not be subject to income tax to the recipient shareholder. Conversely, a distribution which constitutes earnings of the corporation is subject to tax under the present Code, even though there is much current debate as to the desirability of "double taxation" imposed on corporations and their shareholders. The significance of earnings and profits, therefore, is that it determines both the taxability of a distribution and the character of the income to the shareholder (*i.e.*, either ordinary income or capital gain). The amount of earnings and profits of a corporation represents the upper limit or maximum amount of distribution that is taxed as a dividend.

Clearly, the proper determination of a corporation's earnings and profits is extremely important. A common misunderstanding in this area is that a corporation's tax earnings and profits is equal to its accounting retained earnings. While the two concepts are similar, there are significant differences and it is imperative that tax advisers be fully cognizant of the potentially disastrous tax implications of assuming that earnings and profits and retained earnings are identical. In *Meyer's Est.* v. *Comm.*, 200 F. 2d 592, 42 AFTR 1005 (1952), the shareholders believed earnings and profits to be $80,000 (the amount of retained earnings of the corporation) when in fact the amount was over $900,000. The difference was caused by earnings and profits acquired in a tax-free reorganization in an earlier year which was not reflected in retained earnings. The court was somewhat lenient in this particular case, but it illustrates the severe tax result of a serious misunderstanding of the concept of earnings and profits. This case illustrates the importance of distinguishing between earnings and profits and retained earnings. Table 1, presented below, illustrates the principal differences

TABLE 1

WHAT IS EARNINGS AND PROFITS?


Taxable Income (accumulated)
Differences #1 and #3
PRINCIPALLY:
(1) Nontaxable income and nondeductible expenses
(2) Differences between book and tax accounting methods
Schedule M-1 differences, Form 1120
Net Income (accumulated)
Differences #2 and #3
Earnings and Profits (accumulated)
(3) Cash or property dividends
(4) Capitalization of retained earnings through stock dividends
Schedule M-2 differences, Form 1120
Special Adjustments
Retained Earnings
Differences #2 and #4

between tax earnings and profits and accounting retained earnings.

CURRENT AND ACCUMULATED EARNINGS AND PROFITS

Before looking at the computational aspects of earnings and profits, it is important to distinguish current earnings and profits and accumulated earnings and profits, and to point out the differences in treatment of each. Current earnings and profits are those earned by the corporation for the current taxable year whereas accumulated earnings and profits represents the sum of all prior years earnings and profits since February 28, 1913, less prior years' distributions and reductions. The important distinction is that all distributions are first charged against current earnings and profits, and any excess distribution is then charged against accumulated earnings and profits. The Regulations state this precisely.

> In determining the source of a distribution consideration should be given first, to the earnings and profits of the taxable year; second, to the earnings and profits accumulated since February 28, 1913, . . . [2]

This order must be maintained even if the corporation has a deficit in accumulated earnings and profits. Thus, a distribution is taxed to the shareholders as a dividend if the corporation has current earnings and profits even though there may be a deficit in accumulated earnings and profits.

If distributions during the year exceed current earnings and profits, the excess distribution is then charged to accumulated earnings and profits and is taxable to the shareholders as a dividend. If there are no accumulated earnings and profits, or the distributions exceed the amount of accumulated earnings and profits, distributions in excess of current earnings and profits are treated as a return of capital to the shareholders (hence, tax-free and a reduction of basis). Any distribution in excess of a shareholder's basis is taxed as capital gain.

Since current earnings and profits must be computed before accumulated earnings and profits, the flowchart adopts this order as well. The remainder of this article is concerned with the technical computation of earnings and profits. While the flowchart is intended to stand alone, the accompanying narrative is presented to clarify certain aspects of the subject.

COMPUTATION OF EARNINGS AND PROFITS

The best starting point for the computation of earnings and profits is taxable income. While taxable income and current earnings and profits are not synonymous, the simplest way to arrive at current earnings and profits is to make certain adjustments to taxable income. Therefore, this is the beginning point in the flowchart. The bold dotted outlines represent the path toward computation of earnings and profits.

A brief digression at this point is necessary to explain the two branches that precede taxable income. Certain items of income and deduction are not allowed in the computation of either taxable income or earnings and profits. These items are shown on the flowchart for completeness and should be noted as they are important exclusions. The deductions which are disallowed for both computations are shown on the lower part of the flowchart.

The question of whether improper payments are deductible in computing earnings and profits is uncertain at this time. The preponderance of authority

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[2] Reg. 1.316-2(a).

Table 2

Flow Chart for Computation of Corporate Earnings and Profits?

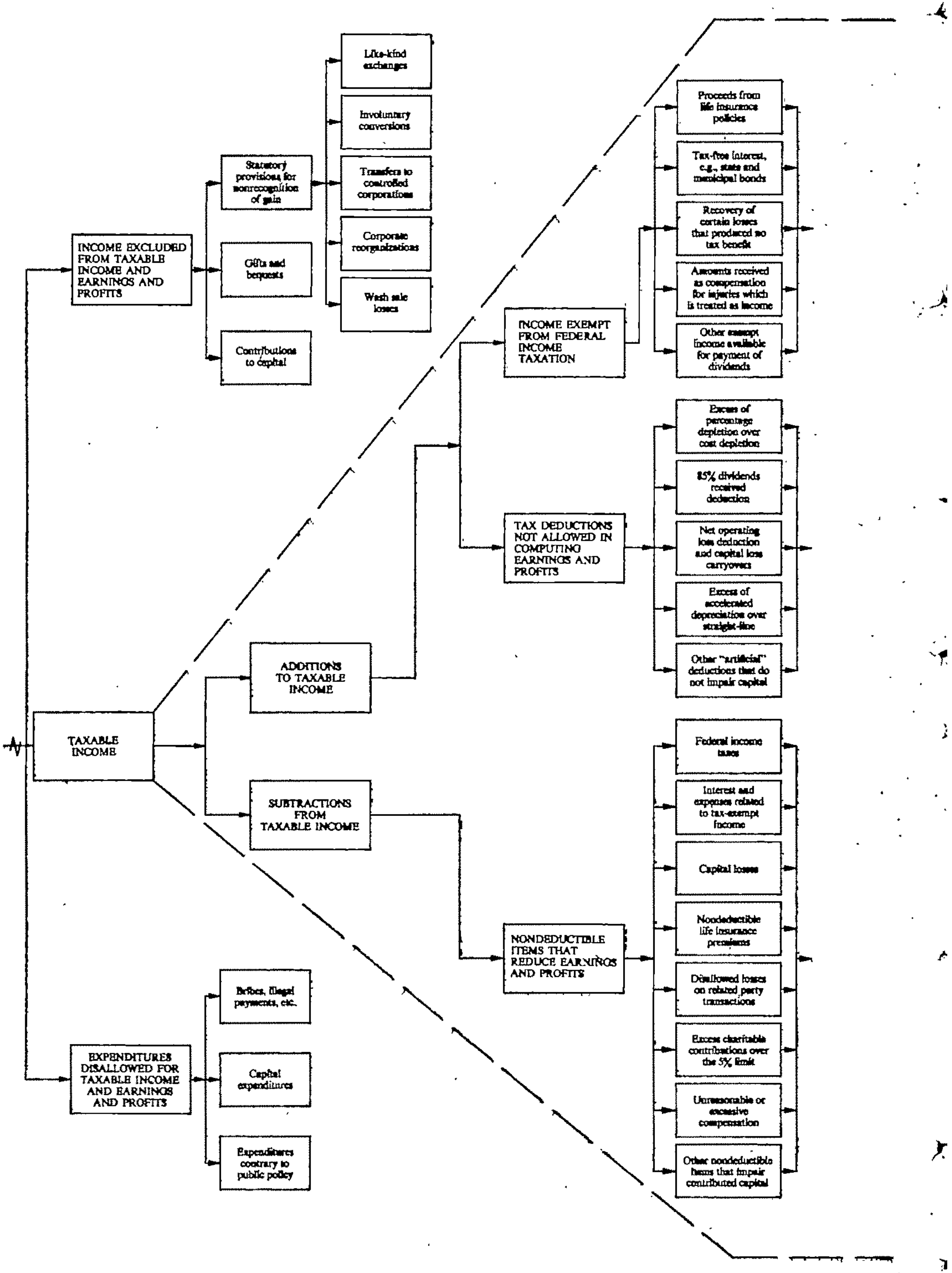
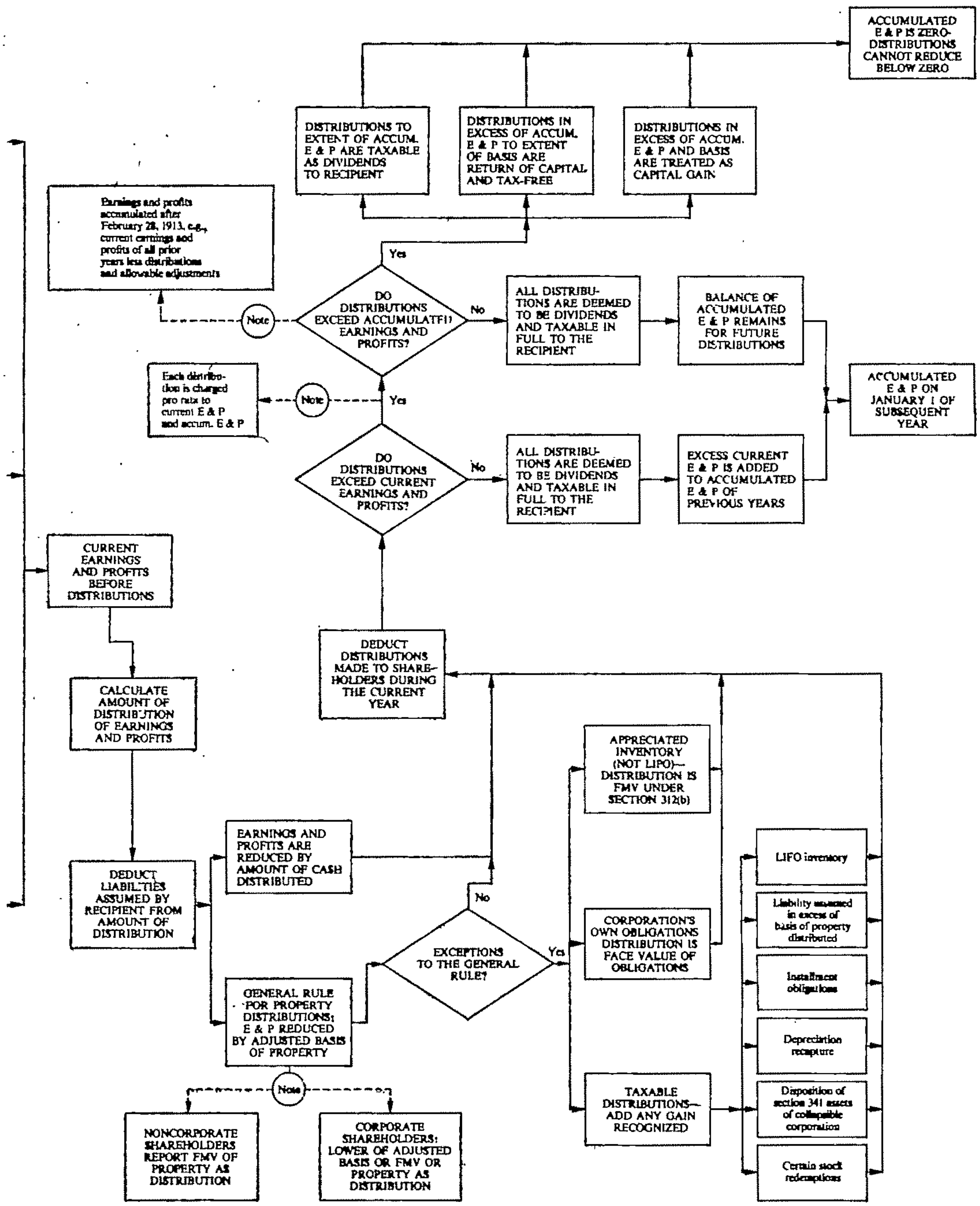

Like-kind exchanges
Involuntary conversions
Transfers to controlled corporations
Corporate reorganizations
Wash sale losses
Statutory provisions for nonrecognition of gain
Gifts and bequests
Contributions to capital
INCOME EXCLUDED FROM TAXABLE INCOME AND EARNINGS AND PROFITS
Proceeds from life insurance policies
Tax-free interest, e.g., state and municipal bonds
Recovery of certain losses that produced no tax benefit
Amounts received as compensation for injuries which is treated as income
Other exempt income available for payment of dividends
INCOME EXEMPT FROM FEDERAL INCOME TAXATION
Excess of percentage depletion over cost depletion
85% dividends received deduction
Net operating loss deduction and capital loss carryovers
Excess of accelerated depreciation over straight-line
Other "artificial" deductions that do not impair capital
TAX DEDUCTIONS NOT ALLOWED IN COMPUTING EARNINGS AND PROFITS
ADDITIONS TO TAXABLE INCOME
TAXABLE INCOME
SUBTRACTIONS FROM TAXABLE INCOME
Federal income taxes
Interest and expenses related to tax-exempt income
Capital losses
Nondeductible life insurance premiums
Disallowed losses on related party transactions
Excess charitable contributions over the 5% limit
Unreasonable or excessive compensation
Other nondeductible items that impair contributed capital
NONDEDUCTIBLE ITEMS THAT REDUCE EARNINGS AND PROFITS
Bribes, illegal payments, etc.
Capital expenditures
Expenditures contrary to public policy
EXPENDITURES DISALLOWED FOR TAXABLE INCOME AND EARNINGS AND PROFITS

TABLE 2 (*Continued*)


ACCUMULATED E & P IS ZERO-DISTRIBUTIONS CANNOT REDUCE BELOW ZERO
DISTRIBUTIONS TO EXTENT OF ACCUM. E & P ARE TAXABLE AS DIVIDENDS TO RECIPIENT
DISTRIBUTIONS IN EXCESS OF ACCUM. E & P TO EXTENT OF BASIS ARE RETURN OF CAPITAL AND TAX-FREE
DISTRIBUTIONS IN EXCESS OF ACCUM. E & P AND BASIS ARE TREATED AS CAPITAL GAIN
Earnings and profits accumulated after February 28, 1913, e.g., current earnings and profits of all prior years less distributions and allowable adjustments
Yes
Note
DO DISTRIBUTIONS EXCEED ACCUMULATED EARNINGS AND PROFITS?
No
ALL DISTRIBUTIONS ARE DEEMED TO BE DIVIDENDS AND TAXABLE IN FULL TO THE RECIPIENT
BALANCE OF ACCUMULATED E & P REMAINS FOR FUTURE DISTRIBUTIONS
ACCUMULATED E & P ON JANUARY 1 OF SUBSEQUENT YEAR
Each distribution is charged pro rata to current E & P and accum. E & P
Note
Yes
DO DISTRIBUTIONS EXCEED CURRENT EARNINGS AND PROFITS?
No
ALL DISTRIBUTIONS ARE DEEMED TO BE DIVIDENDS AND TAXABLE IN FULL TO THE RECIPIENT
EXCESS CURRENT E & P IS ADDED TO ACCUMULATED E & P OF PREVIOUS YEARS
CURRENT EARNINGS AND PROFITS BEFORE DISTRIBUTIONS
DEDUCT DISTRIBUTIONS MADE TO SHAREHOLDERS DURING THE CURRENT YEAR
CALCULATE AMOUNT OF DISTRIBUTION OF EARNINGS AND PROFITS
APPRECIATED INVENTORY (NOT LIFO)—DISTRIBUTION IS FMV UNDER SECTION 312(b)
EARNINGS AND PROFITS ARE REDUCED BY AMOUNT OF CASH DISTRIBUTED
LIFO inventory
DEDUCT LIABILITIES ASSUMED BY RECIPIENT FROM AMOUNT OF DISTRIBUTION
No
Liability assumed in excess of basis of property distributed
CORPORATION'S OWN OBLIGATIONS DISTRIBUTION IS FACE VALUE OF OBLIGATIONS
EXCEPTIONS TO THE GENERAL RULE?
Yes
Installment obligations
GENERAL RULE FOR PROPERTY DISTRIBUTIONS: E & P REDUCED BY ADJUSTED BASIS OF PROPERTY
Depreciation recapture
Note
TAXABLE DISTRIBUTIONS—ADD ANY GAIN RECOGNIZED
Disposition of section 341 assets of collapsible corporation
NONCORPORATE SHAREHOLDERS REPORT FMV OF PROPERTY AS DISTRIBUTION
CORPORATE SHAREHOLDERS: LOWER OF ADJUSTED BASIS OR FMV OR PROPERTY AS DISTRIBUTION
Certain stock redemptions

currently in force including two Internal Revenue Service pronouncements,[3] supports the deduction of improper payments. However, the Tax Reform Act of 1976 amended Section 964(a) to deny the deduction of illegal bribes and kickbacks in computing earnings and profits for controlled foreign corporations (Subpart *F* corporations). It is realistic to predict, although premature, that this new legislation will support efforts to extend this principle to domestic corporations as well. Thus, while the flowchart shows improper payments as not deductible in computing earnings and profits, this question is certainly not settled.

There are three main categories of adjustments which must be made to taxable income to arrive at current earnings and profits. These categories, as can be seen on the flowchart, are:

1. Items of income which are exempt from federal income taxation but are included in the computation of current earnings and profits;
2. Items which are deductible in arriving at taxable income but are not allowable as a reduction of current earnings and profits;
3. Items which are not deductible in arriving at taxable income but are an allowable reduction of current earnings and profits.

The specific adjustments to taxable income shown in the flowchart are the most common and represent the majority of adjustments. There are, however, other minor adjustments which are represented on the flowchart as "other" items. Most of these items occur only infrequently in the life of any one corporation.

As a general rule, the method of accounting used in computing taxable income must be ussd in computing earnings and profits.[4] Thus, if a corporation uses the cash-basis method of accounting in computing taxable income, it must use the cash-basis method in computing earnings and profits.

EFFECT OF DISTRIBUTIONS ON EARNINGS PROFITS

Distributions of property to the extent of the corporation's current and accumulated earnings and profits are taxable as dividends to the recipient shareholders. When the distribution is in the form of cash, the shareholder must report the amount received as a dividend and the corporation accordingly reduces its earnings and profits (but not below zero). However, when property other than cash is distributed, the problems of measuring the distribution increase significantly. The lower part of the flowchart that branches from current earnings and profits is concerned with this measurement problem (described largely by Section 312 of the Code).

The general rule for property distributions is that earnings and profits is decreased by the adjusted basis of the property distributed. This is the case even though non-corporate shareholders must report the fair market value of the property as dividend income (corporate shareholders report the lower of the adjusted basis of the property in the hands of the distributing corporation or the fair market value of the property). However, as can be seen from the flowchart, it is not that simple. There are a number of exceptions, and exceptions to exceptions, which modify the amounts determined from application of the general rule of Section 312(a). The major exceptions are illustrated in this section of the flowchart.

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[3] Rev. Rul. 75-515, 1975-2 C.B. 117 and Rev. Rul. 75-17, 1975-1 C.B. 677. Also, see Tax Management Memorandum 76-20, September 27, 1976.

[4] Reg. 1.312-6(a).

Because of their importance, some of the current issues concerning liquidating distributions are mentioned here. As noted earlier, liquidating distributions do not reduce earnings and profits under Section 312(e). This section refers primarily to partial liquidations (Section 346) and stock redemptions (Section 302). These two types of distributions are treated as full or part payment in *exchange* for stock of the distributee-shareholder and should be contrasted with a taxable distribution out of earnings and profits. A liquidating distribution is tax-free to the extent of the adjusted basis of the stock; any excess is treated as capital gain. Thus, earnings and profits is not reduced by such distributions. An important case in this area, *Baker v. U.S.*, 460 F. 2d 827, 29 AFTR 2d 1116 (8th Cir. 1972), is an extensive analysis of the interrelationship between earnings and profits, redemptions, and dividends. However, the decision of the divided court only demonstrates the diversity of opinion and theories in this area.

The final steps in determining earnings and profits are charted in the latter stages of the flowchart. Effects of distributions in excess of both current and accumulated earnings and profits are shown as well as the treatment of excess distributions to the shareholders. The final amount on the flowchart represents the amount of accumulated earnings and profits as of the first day of the new accounting year.

SUMMARY

The diagrammatic approach to computation of earnings and profits is an effective learning device for an extremely complex topic. Since the components of earnings and profits are spread throughout the Code, the flowchart helps bring together the various sections so as to present an overall perspective of the concept. It should be pointed out, however, that study of this diagram alone may not be sufficient for solving complex earnings and profits problems. Only after a rigorous study of relevant sections of Code, Regulations, textbooks, cases and tax articles can one fully appreciate the complexity of this area of taxation.

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Notes

Some Implications of Parameter Sensitivity Research for Judgment Modeling in Accounting

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ABSTRACT: This article examines the issue of cue weighting in judgment models used to represent human information processors. Illustrative results are presented which show that predictions produced by linear models are very robust with respect to alternative cue-weighting schemes unless the number of predictors included in the models is small, the mean correlation among the predictors is low, and the dispersion of the weights is large relative to their mean. Implications of these results for judgment modeling research in accounting are discussed. Generally, these implications concern the potential improvement in human decision making that might obtain from the search for alternative predictors and/or measurement methods rather than the search for improved methods of weighting predictors in linear models.

One of the unresolved issues of accounting research is the specification of decision models. This issue traditionally has been discussed in the context of accounting theory formation (Committee on Concepts and Standards for External Financial Reports, 1977), but other discussions have contended that decision, or judgment, modeling is also beneficial when applied to internal users, auditors, and accountants themselves (Committee on Human Information Processing, 1977). Judgment modeling in accounting has received increased attention in the past few years by human information processing researchers whose work is based upon well-developed research methods used in psychology. Individuals' judgment models may be specified by direct elicitation techniques, or they may be inferred from the individuals' decisions. Once specified, these models may be used in the determination of data to be supplied to decision makers [Ashton, 1974c; Committee on Accounting Valuation Bases, 1972; Libby, 1975b], or they may be used as a basis for improving the individuals' decisions [Ashton, 1975; Libby, 1976b]. In accounting, judgment modeling has been applied to disclosure decisions [Boatsman and Robertson, 1974; Hofstedt and Hughes, 1977], business failure prediction [Libby, 1975a, 1975b], evaluation of stocks [Wright, 1977a, 1977b], internal control

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evaluation [Ashton, 1974a, 1974b; Joyce, 1976], and other types of decision situations involving accounting data. Libby and Lewis [1977] provide a review of this research.

Three issues are important in the specification of judgment models in accounting: (1) the variables included in the models; (2) the form of the function relating these variables to the individuals' judgments; and (3) the weighting parameters which represent the extent to which the individual utilizes each variable in making judgments. While the selection of variables, or items of information on which the individual presumably bases his judgments, is extremely important, it has received little attention by human information processing researchers. Typically, the researcher specifies a small set of variables which appear to be representative of the various types of information a decision maker would use for a particular type of decision. The functional form issue has received a great deal of attention, and much of the relevant research is reviewed by Ashton [1975, 1976c]. In essence, this research indicates that almost all the predictable variance in judgments is caputred by a simple linear model; the inclusion of more complex terms (exponential, configural, *etc.*) adds very little to our ability to represent individuals' decision processes. The third issue, that of weighting parameters, has begun to receive attention, and it appears that the results of recent weighting parameter research may have some important implications for judgment modeling in accounting. This research suggests, for example, that under certain conditions optimal specification of weighting parameters is not nearly as crucial as many researchers once thought. The purpose of this paper is to delineate these conditions and to suggest several implications for judgment modeling research in accounting.

THE IMPORTANCE OF WEIGHTING PARAMETERS

[1] The growing body of research on the importance of weighting parameters in linear judgment models reveals that the outputs of such models are often quite robust with respect to the weighting parameters employed. Important demonstrations of this fact are provided by Dawes and Corrigan [1974], Einhorn and Hogarth [1975], Srinivasan [1977], and by several other references cited by these authors. The combined discussions of Einhorn and Hogarth [1975] and Srinivasan [1977] imply that the extent of agreement among the outputs of models which employ different sets of weighting parameters increases with (1) an increase in the number of variables included in the models, (2) an increase in the mean intercorrelation among those variables, and (3) a decrease in the variability of the weighting parameters. Actually, this had been recognized many years earlier by Wilks [1938] who proved that, under some very innocuous conditions, the agreement among differently-weighted composites is a simple function of the three variables referred to above. Briefly, Wilks' formula is

$$\bar{r}_{\hat{y}_v\hat{y}_w} = 1 - \frac{\left[\left(\frac{\sigma_v}{\bar{V}}\right)^2 + \left(\frac{\sigma_w}{\bar{W}}\right)^2\right]}{2nr}, \quad (1)$$

where

$\bar{r}_{\hat{y}_v\hat{y}_w}$ is the expected value of the correlation between $\hat{y}_v$ and $\hat{y}_w$,

$\hat{y}_v$ and $\hat{y}_w$ are two linear composites based upon the weighting parameters $V_1, V_2, \cdots, V_n$ and $W_1, W_2, \cdots, W_n$, respectively (*i.e.*, $\hat{y}_v = V_1X_1 + V_2X_2 + \cdots + V_nX_n$ and $\hat{y}_w = W_1X_1 + W_2X_2 + \cdots + W_nX_n$, where the $X_1, X_2, \cdots, X_n$ vectors are in standardized form),

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[1] The following three paragraphs are abridged from Ashton (1978b). Readers interested in the full report, which includes a more detailed discussion of Equation (1), the assumptions on which it is based, and several implications for alternative weighting schemes, will receive that paper upon request.

$\frac{\sigma_v}{V}$ and $\frac{\sigma_w}{W}$ are the coefficients of variation of the sets of V-weights and W-weight,, respectively,

n is the number of X_i variables combined, and

r is the mean correlation among the X_i's.

In words, Wilks' formula estimates the extent of agreement (in correlational terms) between two differently-weighted composites as a function of the number of variables, their intercorrelation, and the variability of the weighting parameters.

To get an idea of the size of $r_{\hat{y}_v\hat{y}_w}$ in accounting-related contexts, consider a "typical" human information processing study in accounting which involves eight variables whose mean intercorrelation is .50. Such a study might be an amalgamation of Boatsman and Robertson [1974], Slovic [1969], Slovic, Fleissner and Bauman [1972], and Wright [1977a, 1977b]. Assume further that the coefficients of variation of the two sets of weighting weighting parameters are .25 and .50. Putting these values of $n=8$, $r=.50$,

$$\frac{\sigma_v}{V} = .25 \text{ and } \frac{\sigma_w}{W} = .50$$

into Equation (1) gives a $\bar{r}_{\hat{y}_v\hat{y}_w}$ of .961, *i.e.*, 92.4 percent ($.961^2$) of the variance captured by one set of weighting parameters can be captured by the other set. Further, $\bar{r}_{\hat{y}_v\hat{y}_w}$ can be increased by increasing the number of variables included in the models, or by using more highly correlated variables, or by using less variable weighting parameters. Even if $n<8$ and $r<.50$, as is sometimes the case in human information processing studies (*e.g.*, Ashton, [1974a, 1974b, 1976a, 1978a]; Kessler [1977]; Libby [1975a, 1975b]), the value of $\bar{r}_{\hat{y}_v\hat{y}_w}$ may still be quite high, as shown in Table 1.

These results have important implications for the types of weighting schemes used in human information processing research. This research tends to be dominated by multiple regression analysis (*e.g.*, Ashton [1976a]; Wright, [1977a],

TABLE 1

		$\bar{r}_{\hat{y}_v\hat{y}_w}$ *as a Function of n, r, and* $\frac{\sigma_v}{V}\left(\text{or } \frac{\sigma_w}{W}\right)$[a]								
	n	4	8	16	4	8	16	4	8	16
	r	.2	.2	.2	.5	.5	.5	.8	.8	.8
$\frac{\sigma_v}{V}$	$\frac{\sigma_w}{W}$									
.00	.25	.961	.981	.991	.985	.993	.997	.991	.996	.998
.25	.50	.805	.903	.952	.922	.961	.981	.952	.976	.98
.50	.75	.493	.747	.874	.797	.899	.950	.874	.937	.96
.75	.75	.297	.649	.825	.719	.860	.930	.825	.913	.95

[a] This table is abridged from Table 2 in Ashton [1978b].

which provides an "optimal" weighting scheme (in a least-squares sense). However, subjective weighting schemes specified directly by the decision maker (*e.g.*, Ashton, [1974a, 1974b]) and equal weighting schemes (*e.g.*, Wright [1977b]) have also been employed. Equation (1) implies that these three types of weighting schemes often will produce outputs which correlate very highly with each other. The use of an equal weighting scheme may be particularly attractive because (1) its coefficient of variation will be .00, (2) it does not require modeling the decision maker, and (3) unlike multiple regression analysis, "shrinkage" of its predictive power is not a problem since it is not estimated from the data [Einhorn and Hogarth, 1975]. A detailed examination of these and other implications for alternative weighting schemes that are relevant for human information processing research is provided by Ashton [1978b].

IMPLICATIONS FOR ACCOUNTING

Several implications of these results for judgment modeling in accounting are discussed in this section of the paper.

Importance of Task Characteristics

Dawes and Corrigan [1974] suggested that linear judgment models provide effective representations of human decision making, in part, because of certain attributes which characterize decision tasks—for example, the conditionally monotonic relationships between independent and dependent variables. Subsequent work in psychology has elaborated on the task in both laboratory and "real-world" decision making. Edwards [1971, pp. 640–41] maintains that:

> . . . psychology is not only about people who emit behavior—it is also, perhaps more importantly, about the tasks that elicit that behavior. . . . [M]any deeply sophisticated psychological theorists fail to recognize how much effort they spend in modelling the task, and how little effort they spend in modelling the behavior of the subject in the task. . . . My own guess is that most successful models now available are successful exactly because of their success in describing tasks, not people.

Similarly, Dawes [1975, p. 119] has suggested that human information processing models

> . . . are primarily models of the task, and that they represent the subjects' behavior only because the subjects have acquired certain (simple) abilities that allow them to behave appropriately (not necessarily optimally) in the task situation.

Brehmer [1976a, 1976b] has suggested that formal (*i.e.*, statistical) task characteristics may be more important than substantive (*i.e.*, content) task characteristics in judgment modeling studies. Researchers in accounting generally devote a great deal of attention to substantive task characteristics, *e.g.*, whether human information processing research done in accounting contexts will produce different results than similar research done in non-accounting contexts. While substantive task characteristics certainly should be given consideration, it is important not to overlook the effects of formal task characteristics in accounting-related studies.

In the present context, for example, the sensitivity of the outputs of judgment models to alternative specifications of weighting parameters depends upon formal task characteristics

$$\left(n, r, \frac{\sigma_v}{\bar{V}} \text{ and } \frac{\sigma_w}{\bar{W}}\right).$$

Thus, the implications of Equation (1) are relevant to a wide variety of substantive modeling contexts. With more *ex ante* consideration of formal task characteristics, researchers in accounting may be able to design experiments more sensibly and to formulate hypotheses more definitively than they could otherwise. Moreover, such consideration should assist researchers in assessing the generalizability of results across task settings.

Relation to Decision Improvement Options

One goal of human information processing research in an applied discipline such as accounting is improved decision making. Pursuit of this goal often involves an attempt to improve human predictions or judgments which are used as parameters in decision models. Three strategies are available for improving human predictions (see, for example, Libby [1976b, p. 673]. They are (1) the human decision maker may be replaced by a model; (2) the human decision maker may be educated to make improved predictions; (3) the data set upon which human predictions are based may be altered. While all three alternatives, and various combinations of them, are available, human information processing researchers focus almost exclusively on the first two alternatives; that is, they focus on the weighting and combination of input data for predictions and largely ignore the initial selection and measurement of the inputs (see Einhorn, 1972, 1974, 1976 for discussion).

Option 1. The implications of the present paper relate primarily to the alternative of replacing the decision maker by a model. Within this alternative, emphasis is placed on reproducing human decisions or predictions via a model instead of on the representation of the decision maker's utilization of particular variables. Research concerning the "man versus model" issue has revealed that a linear multiple regression model derived from an individual's predictions typically predicts a criterion more accurately than does the individual himself. Dawes and Corrigan [1974] suggested that this result occurs, in part, because linear models are robust in three ways—over error in the measurement of variables, over deviations from linearity, and over deviations from optimal specification of weighting parameters. The present paper, along with Ashton [1978b], examines the robustness with respect to weighting parameters in more detail and outlines the conditions under which such robustness will exist.

The results reveal that when certain formal task characteristics are present the problem of specifying weighting coefficients for models used to replicate human predictions becomes trivial. In many cases, equal weights may be used; alternatively, subjective weights (specified by the decision maker) may be used if it is considered important to allow the decision maker to participate in the modeling process. The predictions produced by such models often will correlate very highly with those produced by a multiple regression model of the individual, and such models will perform almost as well as a multiple regression model in the prediction of a criterion. Further, if we allow for shrinkage resulting from cross-validation of multiple regression models, then simpler models may predict a criterion as well as, or better than, regression models. Even if regression models will likely outperform simpler models in a given situation, the practical advantage of this incremental performance should be evaluated *vis-a-vis* the increased cost of developing and using the more complex model [Einhorn and Hogarth, 1975; Lawshe and Schucker, 1959; Schmidt, 1971].

Option 2. These results relate indirectly to the alternative of supplying the decision maker with weighting parameters as part of an educational effort. This approach to improving human predictions typically involves supplying an individual with multiple regression weights from his own prediction equation (and perhaps other information) as a type of feedback designed to assist him to improve his predictive accuracy. The regression coefficients are considered descriptive representations of the decision maker's utilization of the informational cues [Ashton, 1974c]. While the limitations of this interpretation of regression coefficients are well recognized (e.g., Hoffman [1960]), especially in realistic situations involving nonzero cue intercorrelations [Darlington, 1968], regression weights have been used extensively in education-oriented human information processing research. However, the relative insensitivity of the resulting predictions to the specific weights employed, along with several problems involved with the specification of regression weights (see Schmitt and Levine [1977), implies that subjective weights also may prove useful in educational efforts relative to human information processing. Brehmer and Qvarnstrom [1976] and Schmitt and Levine [1977] elaborate on this possibility.

Option 3. To the extent that education of decision makers and/or substitution of models for decision makers can be simplified by the use of equal or subjective weighting schemes, human information processing researchers may devote greater attention to the remaining decision improvement alternative—that of altering the data set upon which predictions are based. This alternative generally is ignored by human information processing researchers in accounting. (Libby [1975b] is an exception.) However, experimenting with alternative predictor variables and/or alternative ways of quantifying such variables may be a very useful avenue for human information processing research. For example, decision makers could be educated to use alternative data sets. There is ample evidence [Goldberg, 1968, pp. 484–85] that judgmental convergence—agreement between judgments made by the same individual but on the basis of alternative data sets—is typically very poor. This implies that judgments, or predictions, made on the basis of some data sets are better than those based on other data sets, although human information processing researchers have not studied this issue systematically.

Another approach within Option 3 is to combine the modeling of decision makers with the use of alternative data sets. In fact, changing the data set may be the most (or only) useful alternative within the modeling option. Judgment models are extremely robust with respect to both functional form and weighting parameters in a large number of instances. Whether they are also robust with respect to alternative data sets has not been determined. Since accounting research has long been concerned with measurement alternatives, this would seem to be a natural area for human information processing researchers in accounting to pursue. The primary benefits of such research would likely come in the data selection and measurement phase, not in the modeling phase, of the effort. In many cases, models could be established quite simply by choosing weighting parameters arbitrarily.

Toward More "Realistic" Experiments

Many attempts to specify judgment models in accounting rely on simplified experimental tasks involving a small number of variables whose intercorrelations are small or zero. While this practice can be defended on several grounds, especially in the "early" stages of such research, it is often maintained that the full "richness" of human decision making can be captured only by increasing the complexity, and hence the realism, of judgment modeling experiments.

The potential benefits of increasing experimental complexity via the inclusion of more variables and/or variables that are more highly correlated with each other may depend on the decision improvement option pursued. For example, if a study focuses upon educating decision makers and employs regression weights as descriptive measures of cue utilization, the researcher should recognize that high cue intercorrelations will cause those descriptive measures to be questionable. On the other hand, if the concern of the study is that of replicating human predictions, high cue intercorrelations will prove advantageous—in the sense that the researcher can devote less attention to the specific modeling procedure employed and more attention to the data set that is being studied. Similarly, if a study focuses upon educating decision makers and employs multiple regression modeling of individuals, the research likely will be quite restricted in the number of cues it can include (in order to keep the experimental task within reasonable cognitive and time constraints). However, if the researcher is concerned with replicating human predictions, and thus decides to use equal or subjective weighting, his research may employ a considerably larger number of cues.

Relation to Predictive Ability Research

The implications of the present paper are not restricted to human information processing research. These results are also relevant for predictive ability research that excludes the human decision maker. In fact, the implications may be more significant for some predictive ability research than for some human information processing research. A good example is the predictive ability research of Horrigan [1966] whose data set involved a relatively large number (17) of independent variables which were moderately to highly correlated—two characteristics which increase the correlation between predictions produced by alternative weighting schemes and which often are not present in human information processing studies.

Importance of Implicit Loss Functions

Equation (1) could be used to develop *general* guidelines for evaluating the predictive power of alternative weighting schemes. It seems presumptuous at this point to suggest definitive guidelines, although such suggestions can be found in the literature (*e.g.*, Burt [1950, p. 122]; Dawes and Corrigan [1974, p. 104]; Einhorn and Hogarth [1975, pp. 185–86]; Gulliksen [1950, p. 321]; and Schmidt [1971, pp. 709–10]). The primary reason that definitive guidelines are difficult to specify is our incomplete knowledge of loss functions associated with prediction errors. The error metric employed in almost all human information processing research, including Wilks' formula, is based on the zero-order correlation coefficient. Very little research has employed other metrics or attempted to assess the sensitivity of results over alternative metrics. However, Srinivasan [1977] found that his analytical results (concerning regression weighting versus equal weighting) based on an expected mean squared error criterion were a very close approximation to results based on a correlation criterion. On the other hand, Libby's [1976a] business failure study, which employed the number of correct predictions (hit rate) as the achievement criterion, is the only published research in which subjects generally outperformed their models. All prior studies used correlation as the achievement measure, and this difference in achievement criteria is one possible explanation for the difference in results [Goldberg, 1976]. A recent study by Kessler [1977] concerning subjects' ability to learn to improve their achievement in a bond rating task employed five measures of achievement—correlation, hit rate, number of ratings correct within one rating category, mean absolute error, and mean squared error. Analyses based on hit rate and mean absolute error produced results inconsistent with those based on the other three achievement measures, as well as with those of prior studies which had used only correlation.

At this point in our knowledge of the loss functions actually employed by decision makers, it may be useful to present distributions of prediction errors and to allow decision makers to apply their own loss functions (*cf.* Beaver, Kennelly and Voss [1968, p. 682]. Further, it should be noted that an error of a particular magnitude, based on a chosen error metric, may be differentially important as a function of the substantive decision context. For example, in medical decision making an improvement in predictive accuracy of, say, .03 correlation units may be considered extremely important, whereas it may be viewed as much less significant in some other context. Sensitivity of loss functions to alternative weighting schemes in accounting contexts is an obvious complementary research area for human information processing researchers.

CONCLUSION

This paper examines the effect of alternative weighting schemes on predictions produced by linear models designed to replicate human predictions. The results indicate that such effect is very slight unless the number of independent variables is small, the average correlation among the independent variables is low, and the dispersion of the weights is large relative to their mean. Based on these results, it is suggested that resources devoted to human information processing research often might be better applied to the search for alternative predictor variables and/or measurement methods than to the search for superior ways of weighting those variables in a prediction model.

While the earlier discussion relates primarily to independent (predictor) variables, it is important to recognize that this suggestion also applies to dependent (criterion) variables. Ashton [1976b, p. 680] has noted previously that criterion selection is an important issue in human information processing research, and Libby [1975a] has suggested that his own results, based on an "extreme" (p. 160) operational definition of failure, cannot be generalized to less extreme forms of failure. However, human information processing researchers in accounting have not investigated empirically the effects of alternative measures of independent or dependent variables. The analysis by Ashton [1978b], along with the present general discussion, suggests that we should.

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Duration and Risk Assessments in Capital Budgeting

Edward Blocher and Clyde Stickney

ABSTRACT: This paper brings to the accounting literature the results of recent research from other disciplines on a measure called duration and examines its potential usefulness in capital budgeting decisions. Duration is defined as the number of periods which elapse before the average present value dollar is received from a stream of cash flows. In this paper, the authors define duration and describe its major attributes. Its potential for assessing the risk of changes in required rates of return and the risk of illiquidity are then explored in a capital budgeting setting.

In 1938, Frederick R. Macaulay proposed a measure called *duration* to represent the average maturity of a stream of payments. Since that time, duration has been used often in economics, finance, and insurance.[1] It is surprising, however, to find only a few references to duration in the accounting literature. In this paper, we (1) define duration and summarize its major attributes, and (2) suggest its potential as a measure for assessing risk in capital budgeting decisions. In particular, we show that the duration of a capital project is precisely the elasticity number relating percentage changes in net present value of the project to changes in the discount rate. This elasticity attribute provides a simple, direct measure of the risk of changes in the net present value of a project, and therefore a firm, from changes in a firm's cost of capital.

DEFINITION AND ATTRIBUTES OF DURATION

Duration may be defined as the weighted average life of an investment, where the weights used are the present values of the cash flows received each period as a percentage of the total present value of all future cash flows.

It is calculated as follows:

$$\text{Duration} = \frac{\sum_{t=1}^{n} t \frac{CF_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}} \qquad (1)$$

Where:

CF_t = a cash flow to be received t units of time from today, beginning with $t=1$ period from today.

r = an appropriate discount rate for determining the present value of the cash flow.

To illustrate the calculation of duration, assume that \$26,143 is invested in a

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[1] For a brief summary, see Weil [1973].

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TABLE 1

ILLUSTRATION SHOWING THE CALCULATION OF DURATION

(1) Year	(2) Cash Flow	(3) Present Value Factor at 10%	(4) = (2) × (3) Present Value of Cash Flows	(5) = (4) ÷ $26,143 Percentage of Total Present Value	(6) = (5) × (1) Calculation of Weighted Average Life
1	$16,000	.909	$14,544	.556	.556
2	8,000	.826	6,608	.253	.506
3	4,000	.751	3,004	.115	.345
4	2,000	.683	1,366	.052	.208
5	1,000	.621	,621	.024	.120
Total	$31,000		$26,143	1.00	1.735

Duration = 1.735 years.

new machine which promises cash savings during the five years of its expected useful life of $16,000, $8,000, $4,000, $2,000, and $1,000, respectively. Table 1 shows the calculation of duration for this project. The project has an internal rate of return of 10 percent, and this rate is used in the illustration to compute the project's duration. As we discuss later, however, discount rates other than the project's internal rate of return could be used. Table 1 indicates that the average present value dollar is received 1.735 years after commencing the project—this is the project's duration at a discount rate of 10 percent.

Most of the previous research on duration has been in connection with bonds, for which there is a single cash outflow immediately, followed by a series of future cash inflows. However, if duration is to be useful in capital budgeting decisions, it must be adaptable to various patterns of cash inflows and outflows. The principal difficulty in using duration as defined above occurs when a capital investment project has a net cash *outflow* during some future period. In these cases, duration can be defined as the difference between the duration of the net cash inflows and the duration of the net cash outflows [Durand, 1974, p. 25].

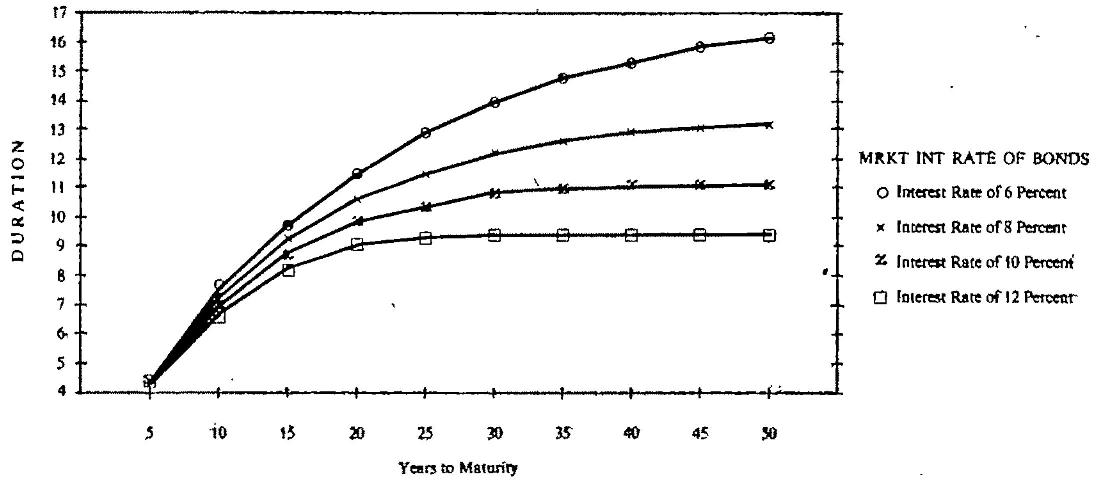
Duration has several interesting properties. Many of these properties can be understood by referring to Figure 1, which shows the relationship between duration and the number of years to maturity for 8 percent coupon bonds. The relationship is plotted for four discount rates: one less than, one equal to, and two greater than the coupon rate.

The properties are as follows:

1. The duration of a stream of cash flows is always less than the time of the last cash flow (unless the stream is a single cash flow, in which case duration is equal to the number of periods which elapse until that last cash flow).
2. The difference between a project's life and its duration is relatively small for shorter lived projects but increases as the life of the project is increased.
3. Duration varies inversely with the discount rate used. The higher the discount rate, the shorter will be the time until the average present value dollar is received.
4. If an investment project has a zero or positive net present value at the discount rate used (analogous to discount rates of six percent and

FIGURE 1

DURATION VALUES FOR 8 PERCENT BONDS



eight percent in Figure 1), duration increases at a decreasing rate as the life of the project is increased but is bounded [Fisher and Weil, 1971]. If the project has a negative net present value at the discount rate used (analogous to discount rates of 10 percent and 12 percent in Figure 1), duration increases, levels off, and then decreases as the life of the project is increased. The decrease occurs though only for projects with a life greater than approximately 100 years [Hopewell and Kaufman, 1973].

5. Duration is relatively insensitive to the discount rate used for shorter-lived projects, but becomes more sensitive to the discount rate as the life is increased.

SELECTING THE DISCOUNT RATE

One question which must be addressed in calculating duration is: What is the appropriate discount rate? Is it the project's internal rate of return, the firm's cost of capital, or some other rate?

The applications of duration in the finance literature have used a bond's yield to maturity as the discount rate. Most of these studies have been concerned with the sensitivity of a bond's market price to changes in market interest rates [Hicks, 1939; Haugen and Wichern, 1974, Hopewell and Kaufman, 1973]. The yield to maturity, or internal rate of return, is clearly the appropriate rate in these cases. However, in a capital bugeting context, a case can be made on theoretical grounds for using the firm's cost of capital. The cost of capital is usually chosen as a more appropriate reinvestment rate. Also, use of the cost of capital eliminates the problem of multiple internal rates of return which occurs when cash flows reverse from positive to negative or vice-versa over a project's life.

How serious a concern is the selection of a discount rate in typical capital budgeting situations? To study this question, we created 126 investment projects (data available from the authors upon request) and classified them into one of three groups (42 projects each) as follows:

Group 1: Projects involving an immediate cash outflow followed by a series of equal cash inflows.

Group 2: Projects involving an immediate cash outflow followed by a series of unequal cash inflows.

Group 3: Projects involving several years of cash outflows followed by several years of cash inflows of varied patterns.

The first group of projects is typical of sinking fund investments. Group 2 reflects patterns of cash flows characteristic of most fixed asset investments. Research and development projects are a good example of Group 3 projects. The projects selected for each group were chosen so that each group had a random assortment of project lives (from a minimum of five to a maximum of 15 periods) and internal rates of return (from five to 25 percent).

For each of the projects we determined the range of duration values, when duration is calculated using a five percent discount rate and a 25 percent discount rate. This measure indicates the change in the absolute value of duration for this 20 percentage point change in the discount rate. Table 2 presents the results of this analysis for the three groups of projects and for various project lives. Column (2) indicates the difference in duration (*i.e.*, the range) when discount rates of five percent and 25 percent are used. The differences are averaged across all projects within a particular group and sub-group. Column (3) indicates the largest difference for a single project within each sub-group. Column (4) indicates the average change in the value of duration for a one percentage point change in the discount rate, again averaged across all projects in the sub-group.

As illustrated in Figure 1 and in Table 2, the sensitivity of duration to differences in the discount rate does become greater as the life of the project increases. However, none of the changes appears very

TABLE 2

SENSITIVITY ANALYSIS OF DURATION VALUES

	(1) Number of Projects	*(2)* Average (over all projects in each group) Difference in Duration Values, for Duration at r = .05 and r = .25	*(3)* Largest Single Difference, for Duration at r = .05 and r = .25	*(4)* Average (over all projects in each group) Change in Duration for a One Percentage Point Change in Discount Rate
Group 1:				
5–7 Period Project Life	15	.529	.663	.0265
8–11 Period Project Life	15	1.169	1.543	.0585
12–15 Period Project Life	12	2.290	2.644	.1145
Group 2:				
5–8 Period Project Life	15	.608	1.016	.0304
9–12 Period Project Life	11	1.579	2.456	.0790
13–15 Period Project Life	16	2.348	3.301	.1174
Group 3:				
5–9 Period Project Life	15	.130	.344	.0065
10–12 Period Project Life	16	.319	.828	.0160
13–15 Period Project Life	11	1.010	1.830	.0505

large. The maximum average difference for a one percentage point change in the discount rate is .1174 periods for group two projects with a 13–15 period life. In general, it would seem that for discount rates up to 25 percent and project lives up to 15 years, duration is relatively insensitive to the discount rate.

DURATION AND CAPITAL BUDGETING DECISIONS

Having defined duration and its major attributes, we are now ready to consider its potential as a tool for evaluating capital budgeting proposals. In particular we would like to suggest its role as a tool for evaluating two dimensions of risk: changes in required rates of return and liquidity.

Risk of Changes in Required Rates of Return

One of the most important uses of duration with respect to bond investments is in measuring expected changes in market prices of bonds as a result of changes in interest rates [Hicks, 1939]. That is, duration serves as a measure of sensitivity, or elasticity, of market prices to changes in interest rates. Hopewell and Kaufman [1973, p. 751] provide a proof of this relationship. They show that the percentage change in market price is equal to the percentage change in interest rates times duration with its sign reversed. That is:

$$\frac{dP}{P} = - D\frac{dr}{(1 + r)} \qquad (2)$$

Consider the example in Table 1. If interest rates increase from 10 percent to 12 percent, Equation (2) above suggests that the market price of this bond should decrease by 3.154 percent [=1.735(.02 ÷1.10)]. A 3.154 percent reduction will lead to a decrease in price from $26,143 to $25,318. In comparison, the present value of the cash flows from this project discounted at 12 percent is $25,349, the difference from that predicted due to rounding.

Thus, other things being equal, the larger the duration, the more sensitive will be a bond's market price to changes in interest rates.

This elasticity attribute of duration can be interpreted for capital budgeting decisions. In this context, though, the risk is of a loss in net present value of a project and the firm from changes in required rates of return. For example, assume the project summarized in Table 1 was accepted because its internal rate of return of 10 percent exceeded the firm's cost of capital of eight percent. Suppose that immediately after acquiring the asset, investors for some reason increase the rate of return they require for investing in the firm. As a result, the firm's cost of capital increases to nine percent. The investment yielded a net present value of $856 when the cost of capital was eight percent. At a required rate of return of nine percent, the proejct has a net present value of $419, a decrease in net present value of $437.

The risk of losses from increases in the required rate of return can be minimized by selecting otherwise comparable projects that have the smallest duration. In this way, the net present value loss per dollar invested from an increase in required rates of return will be minimized. This decision rule is illustrated in the top panel of Table 3. Projects A and B have internal rates of return of 10 percent and durations of 2.190 and 1.734, respectively. If the required rate of return increases from eight to nine percent, Project B, with the shorter duration, would have been best. The net present value loss per dollar invested for Project B is $.018, whereas for Project A it is $.021.

TABLE 3

ILLUSTRATION SHOWING STRATEGIES TO COPE WITH CHANGES IN REQUIRED RATES OF RETURN

	Cash Inflow (Outflow) in Period:						
	0	*1*	*2*	*3*	*4*	*5*	
Project A	$(12,092)	$ 5,000	$4,000	$3,000	$2,000	$1,000	
Project B	$(26,149)	16,000	8,000	4,000	2,000	1,000	
						Project A	*Project B*
Duration						2.190	1.734
Net Present Value at 8%						$499	$850
Net Present Value at 9%						243	413
Decrease in Net Present Value						$256	$437
Decrease in Net Present Value per Dollar Invested ($256÷$12,092; $437÷$26,149)						$.021	$.018
Net Present Value at 8%						$499	$850
Net Present Value at 7%						762	1,298
Increase in Net Present Value						$263	$448
Increase in Net Present Value per Dollar Invested ($263÷$12,092; $448÷$26,149)						$.022	$.017

Selecting otherwise comparable projects with the shortest duration is a two-edged sword, however. If the required rate of return decreases, Project A, with the longer duration, would have been better. This is shown in the bottom panel of Table 3. A decrease in the required rate of return from eight to seven percent results in an increase in net present value for both projects. The increase per dollar invested is largest, however, for Project A.

The decision rules with respect to changes in required rates of return can, therefore, be summarized as follows:

1. For the risk-averse manager unwilling to speculate on changes in required rates of return, otherwise comparable projects with the smallest duration should be selected.
2. For the manager willing to speculate on the direction of a change in required rates of return, the rules are:
    a. Select otherwise comparable projects with the smallest duration if required rates of return are speculated to increase.
    b. Select otherwise comparable projects with the largest duration if required rates of return are speculated to decrease.

It should be noted, however, that once the direction and amount of the change in required rate of return become the market consensus, it will be reflected in market prices and any gains from speculation will be eliminated.

Illiquidity Risk

Payback is commonly used as a measure for assessing illiquidity risk. That is, the quicker the initial investment is recouped through cash inflows, the less likely the firm will find itself with insufficient liquid resources.

In studying duration and its usefulness in assessing illiquidity risk, we addressed two questions:

1. Do payback and duration generally rank competing projects the same?
2. Are there situations where the two measures give conflicting rankings of projects?

To address the first question we correlated duration with payback and present value payback for the 126 projects referred to earlier. The degree of correlation is measured using Pearson's product-moment correlation. Table 4 presents the correlation coefficients for the three groups of projects using discount rates of five percent, 15 percent, 25 percent, and each project's internal rate of return. The number in parentheses is the α level of significance.

TABLE 4

CORRELATION OF DURATION WITH PAYBACK MEASURES

	Payback	*Present Value Payback*
	$R=.05$	
Group 1	.5247(.001)	.5149(.001)
2	.6297(.001)	.5778(.001)
3	.6699(.001)	.6515(.001)
	$R=.15$	
Group 1	.5421(.001)	.7759(.001)
2	.6260(.001)	.4157(.027)
3	.6810(.001)	.8349(.001)
	$R=.25$	
Group 1	.5605(.001)	not applicable
2	.5989(.001)	not applicable
3	.6789(.001)	not applicable
R = the internal rate of return for each project		
Group 1	.8162(.001)	.9103(.001)
2	.8688(.001)	.7705(.001)
3	.7916(.001)	.8928(.001)

Note: $n=42$ for each correlation measured above with the exception of the correlations of duration with present value payback, since present value payback is not defined for a project when the discount rate is greater than the project's internal rate of return. Thus, for $r=.05, n=42$; $r=.15, n=15$; $r=.25$ $n=0$; $r=$project internal rate of return, present value payback = project life.

The correlations between duration and payback are all large and statistically significant at .1 percent. The correlation of duration and payback is highest for all groups when the discount rate used to compute duration is the project's internal rate of return, as shown in the lower portion of Table 4. In fact, it can be shown that for Group 1 projects, as the project life becomes large ($n \rightarrow \infty$), payback and duration become functionally related as follows (where IRR is the internal rate of of return):

$$\text{Payback} = \left(\frac{1}{1+\text{IRR}}\right) \cdot \text{Duration} \quad (3)$$

This follows from the fact that, as n becomes large, the payback period approaches the reciprocal of the internal rate of return for a project, and as n increases, duration approaches

$$\frac{1+\text{IRR}}{\text{IRR}}$$

[Boardman, 1975].

Also, it is clear from Table 4 that the degree of correlation does not change significantly for changes in the discount rate. This is consistent with the previous finding that duration is insensitive to the discount rate for projects with modest lives.

The correlations between duration and present value payback are also large and statistically significant. The slight deterioration for Group 2 projects at a discount rate of 15 percent is due primarily to the inclusion of a smaller number of projects (see note to Table 4).

In most instances, then, duration and payback measures rank competing projects the same. Given the relative ease in calculating payback, it is usually more cost-efficient to use payback. We were interested, though, in whether duration provides a superior ranking measure in certain situations. Two such possible situations were identified.

One situation occurs when the cash flows from projects are highly variable from year to year. Consider Project C and Project D in the upper panel of Table 5. Both projects require investments of $25,000, have five-year lives, and have internal rates of return of 10 percent. Payback and present-value payback rank Project D higher than Project C. Just the opposite ranking occurs when duration is used. Payback, of course, fails to recognize the differences in the timing of cash flows. Even present-value payback fails to capture the differences in cash flows, because it ignores cash inflows after the present-value payback period is reached.

A second situation where conflicting rankings can occur is where there are net cash outflows in years after the initial investment. Consider Projects E and F in the lower panel of Table 5. The payback measures rank Project E over Project F, while the duration measures do just the opposite. Here again, payback ignores the timing of cash flows and present-value payback ignores cash flows past the present-value payback period.

Thus, as a measure of illiquidity risk in a wide variety of situations, duration appears to outperform payback. The benefits of duration in these few situations may not, however, be worth the extra cost of calculation.

SUMMARY

In this paper we have defined duration and examined its potential usefulness in capital budgeting decisions. Recent research in economics and finance has demonstrated its potential in dealing with other issues. For example, Grove [1974] showed that duration can be used in determining the optimal maturity struc-

TABLE 5

ILLUSTRATION SHOWING INCONSISTENT RANKINGS USING PAYBACK AND DURATION MEASURE

	Cash Inflow (Outflow) in Period:					
	0	*1*	*2*	*3*	*4*	*5*
Project C	($25,000)	$16,000	$1,000	$4,000	$6,000	$4,071
Project D	($25,000)	1,000	8,000	16,000	4,000	4,404
				Project C	*Project D*	
Payback				3.67	3.00	
Present-Value Payback at 10%				5.00	5.00	
Present-Value Payback at 8%				4.63	4.52	
Duration at 10%				2.17	2.99	
Duration at 8%				2.30	3.18	

	Cash Inflow (Outflow) in Period:						
	0	*1*	*2*	*3*	*4*	*5*	*6*
Project E	($200)	($100)	$50	$50	$100	$100	$145
Project F	($50)	($100)	($150)	50	100	100	172
					Project E	*Project F*	
Payback					5.00	5.29	
Present-Value Payback at 10%					6.00	6.00	
Present-Value Payback at 8%					5.75	5.82	
Duration at 10%					4.05	3.54	
Duration at 8%					4.07	3.56	

ture of the balance sheet. Boquist, Racette and Schlarbaum [1975] demonstrated that duration is functionally related to market *beta*. Perhaps the time has come to explore more fully its applicability to other accounting problems.

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Fantasyland Accounting Research: Let's Pretend . . .

Robert E. Jensen

David Pierce [1977, p. 20] notes that "the economy is a miserable experimental design." Unfortunately, statistical tools in experimental design and analysis are not easily adapted to miserable situations rampant with non-stationarities, interactions, missing variables, measurement error, autocorrelation, multicollinearities, *etc.* From the standpoint of financial statement analysis and forecasting, most business firms are also "miserable experimental designs." Accounting researchers, nevertheless, often rely heavily upon the fallible statistical tools of such designs.

A major danger is the mechanical use of statistical techniques in overly superficial settings which have little or no relevance to accounting issues. This paper is directed to this danger which seems to me to be increasingly common in the accounting literature. Particular attention is directed to autocorrelation in accounting data.

AN EARNINGS FORECASTING EXAMPLE

A case in point is the recent paper by Ferrara [1977], which appeals to me as an interesting inquiry into statistical design and analysis dealing with normality assumptions of multiplication of random variables versus addition (subtraction) of such variables. I like the paper from the standpoint of statistics research. However, to put such a design and analysis in the accounting context of return on investment (ROI) versus residual income (RI) confidence interval statistical estimation leads to, in my viewpoint, serious dangers.

Accounting readers are likely to be intrigued by illustrations such as that given by Ferrara [1977, p. 599] in which it is stated that "ROI would fall between 16.1 percent and 24.0 percent ninety-five percent *of the time* [emphasis mine]."[1] In the artificial world postulated by Ferrara, such a process can be generated via computer simulation. Perhaps such a

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[1] Although the wording "fall between $L\%$ and $U\%$ 95% of the time" is somewhat common in business research, it is not technically correct and does in fact mislead readers. In empirical estimation of lower (L) and upper confidence limits, the $[L, U]$ values are in fact random variables. In repeated sampling or trials the true values may lie between L and U, but the $[L, U]$ values vary from trial to trial. Bowker and Lieberman [1959, pp. 215–16] correctly note that:

> But there would be no operational meaning in the following statement made in any one instance: "the probability is 0.95 that the true average setting falls within the limits computed in this case" since mu either does or does not fall within the limits. It should also be emphasized that even in repeated sampling the confidence interval will vary in position and width (if the variability of machine weighings is unknown) from sample to sample.

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situation could also be postulated for casino-type betting in which each "trial" of the game entails a new "investment" and returns from trial to trial are independent.

I cannot, however, imagine real-world accounting circumstances in financial statements where the design analyzed by Ferrara would be appropriate. Although his design could be criticized for several unrealistic assumptions, the assumption that I will focus upon is the implicit assumption of non-autocorrelation. Autocorrelation can easily be assumed away in an artificial computer simulation whereas it is almost always present in real-world ROI and RI variates.

In business firms most capital investments are intended to generate returns over multiple time periods. Let y depict period net income and x depict investment "in the context of conventional financial statement analysis" postulated by Ferrara [1977, p. 598]. We then have $\mathrm{ROI}=y/x$ and $\mathrm{RI}=y-ix$, where the desired capital charge is i. There is some doubt whether y and x are random variables; certainly investment (x) is subject to discretionary control. This issue, however, will not be taken up here. In "conventional financial statements" the procedure is to compute net income (y) over an interval of time such as a year. Investment (x) must then also be specified for the same period, *e.g.*, average annual investment. If y_t and x_t depict such measurements for period t, then it would be common for y_t and x_t to be autocorrelated with their respective $t-1, t-2, \cdots,$ prior-period counterparts and correlated with each other. For instance, net income in one year is seldom uncorrelated with *prior year* net income and investment patterns. In this more realistic situation the statistical design suggested by Ferrara is not appropriate, and confidence intervals computed by these models are misleading.

The calculation of confidence intervals in Ferrara's design should have entailed calculation of the correlation of income (y) with investment (x). For example, the residual income variate $\mathrm{RI}=y-ix$ has a variance

$$\sigma^2 = \sigma_y^2 + i^2\sigma_x^2 - 2i\sigma_y\sigma_x\rho_{yx},$$

where

$\sigma_y^2 \equiv$ the variance of the net income variate,
$\sigma_x^2 \equiv$ the variance of the investment variate,
$i \equiv$ cost of capital,
$\rho_{yx} \equiv$ the correlation between income and investment.

Unless the unrealistic assumption is imposed that income and investment have zero correlation, the correlation between income and investment must be estimated in order to estimate the residual income variance σ^2.

If historical income and investment observations are used to calculate a r_{yx} sample estimate of their ρ_{yx} correlation, then the usual correlation or equivalent regression analysis procedures assume that autocorrelation is not present (*e.g.*, see Johnston [1972, Chapter 8]). If autocorrelation is present, serious statistical difficulties arise. Autocorrelation is often overlooked in econometrics as well as accounting (*e.g.*, Granger and Newbold [1974, 1977], Granger [1977], and Pierce [1977] discuss the problem). Granger and Newbold [1977, p. 202] assert that "one of the problems raised by serially correlated errors is that the usual tests of significance are invalid." Pierce [1977, p. 1] asserts:

> Numerous economic variables which are generally regarded as being strongly interrelated may with equal validity, based on recent empirical evidence, be regarded as independent or only weakly related. Differences

> between these results and the *bulk of econometric literature* are attributed to the failure of the latter to satisfactorily *account for autocorrelation*. Due to limitations in the data, it is concluded that in many instances where economic relationships clearly do exist, econometric or other empirical means cannot reliably enable their existence to be ascertained. [Emphasis mine].

Additional problems arising due to autocorrelation include underestimated sampling variances and inefficient predictions. Examples of spurious regression in the presence of autocorrelation are given by Granger and Newbold [1974, 1977]. Other examples are given by Nakamura *et al.* [1976].

OTHER SELECTED ACCOUNTING EXAMPLES

In addition to the Ferrara [1977] paper, other accounting applications also have implicit assumptions which restrict these applications mainly to artificial worlds. Often it is the more severe problems which remain unmentioned, while accounting researchers dispute lesser statistical problems. For instance, the Jaedicke and Robichek [1964] stochastic C-V-P model has been widely disputed for its assumptions of normality and uncorrelated variates. Let the profit function be

$$y = (p - v)q - f$$

where input variates are price (p), variable cost (v), quantity (q), and fixed cost (f). Jaedicke and Robichek assumed that components of the profit function are independent and normally distributed random variables and that their products are normally distributed. Various writers disputed these unrealistic assumptions (*e.g.*, Ferrara et al. [1972], Hilliard and Leitch [1975], and Dickerson [1974]). But little or no attention was paid to the more difficult problem of autocorrelation. If quantity, price, and cost variates are derived from past time series, then heed must be given to the possibility of autocorrelation as well as normality and variate independence assumptions. Autocorrelation is not adequately dealt with even by writers who try to avoid all distribution assumptions, (*e.g.*, Buzby [1974], Johnson and Simik [1974], and Liao [1975]).

Many efficient markets studies, such as those relating earnings and stock prices, have tried to deal with autocorrelation by utilizing first differences , (*e.g.*, see Ball and Brown [1967]). If y_t and x_t depict prices and earnings respectively at time t, then $\nabla y_t = y_t - y_{t-1}$ and $\nabla x_t = x_t - x_{t-1}$ first differences are commonly used because of suspected autocorrelation in the y_t and x_t variates. First differencing may also be used to achieve stationarity. However, it is frequently overlooked that tests of relations between first differences of two series are not the same as with relations between the series themselves. Nakamura *et al.* [1976, p. 214] state:

> A simple example may help to illustrate this point. Arbitrarily draw any two smooth curves. Divide each of these into N equal segments. On the vertical division lines between these segments, mark off for Curve 1 points alternately one unit above and one unit below the curve. Repeat with Curve 2. The two new curves may obviously be made to have highly positively correlated first differences. However, as is evident from the manner of construction, the original values of these new series may have zero or even a negative correlation. Another difficulty is that when an autoregressive transformation is performed on actual economic time series, random measurement error variances will likely be amplified relative to the phenomena under study.

Autocorrelation is also ignored in many behavioral accounting experiments, especially where subjects are asked to make sequential decisions. For example, little attention is devoted to such issues in lens model studies of decision making (*e.g.*, see Wright [1977], Ashton [1974], and Jensen [1977, p. 160).

IMPLICATIONS OF AUTOCORRELATION

In previous sections, the accounting examples were couched in terms of associating accounting variables by means of correlation or regression analyses. In these analyses and related inference confidence interval testing, autocorrelation is usually a complicating factor. Time series analysis is more adapted to autocorrelation, but even here when researchers attempt to relate two or more variates complications arise.

Two out of many types of single equation time series regression models are shown below (assuming x_{j0} and y_0 are ones):

Model (I) *Exogenous Variates*

$$y_t = \sum_{j=0}^{m} B_j x_{jt} + \varepsilon_t,$$

Model (II) *Lagged Endogenous and Exogenous Variates*

$$y_t = \sum_{i=1}^{i=k} A_{t-i} y_{t-i} + \sum_{j=0}^{m} B_j x_{jt} + \varepsilon_t.$$

Models with multiple equations may be considerably more complex, although not always, as is shown by Zellner [1961]. Original variates may be replaced by first differences ∇x_{jt} and ∇y_{t-1} counterparts although interpretations differ as was noted earlier.

In both of the above models, it is assumed that variates are observed over time sequences t, $t-1$, $t-2$, etc., a common situation in accounting research. Autocorrelation will arise in Model I if the ε_t residual error terms are not serially independent, *i.e.*, past ε_t values have predictive value after time t. It is assumed that the x_{jt} variates are exogenous and not lagged. Model II reduces to a time series autoregression model if all $B=0$. Exogenous variates are added when $B=0$. Model II with exogenous variates is much more difficult to apply in practice than is the autoregressive model. However, Model II and extended versions of Model II are much more relevant to accounting processes.

Model I

In Model I, the usual procedure is to test for the presence of autocorrelation, *e.g.*, via the Durbin-Watson *d* test. If *d* is not significant, the residual ε_t error time series is assumed to be white noise and autocorrelation is suspected *not* to be present. Granger and Newbold [1977, p. 202] state "it is by no means uncommon to find in published applied econometric work equations of an apparently high degree of goodness of fit, as measured by the coefficient of multiple correlation R^2 or the 'corrected' coefficient R^2, but with extremely low values of the Durbin-Watson *d* statistic." It is possible to demonstrate that such results are very dubious, since high *spurious* R^2 values are quite simple to generate from simulated *independent* random walks, (*e.g.*, see numerical examples of Granger and Newbold [1974, 1977 (pp. 202–14)] and Nakamura *et al.* [1976]). Pierce [1977, p. 14] writes:

> The distribution of the sample cross-correlation or regression coefficients, even under a null hypothesis of no causality, is more complicated in the presence of autocorrelation, and the type of autocorrelation often found is such that ignoring these complications results in *grossly overestimating significance of the tests*, i.e., of asserting relationships that don't exist. Thus it is desirable to seek a way to take account of the autocorrelation in *x* and *y* prior to a cross-correlation analysis (or the auto-correlation in the disturbances in conjunction with a regression analysis). [Emphasis mine[.

If, on the other hand, autocorrelation is detected, it is well known that significance tests are invalidated (*e.g.*, see Johnston [1972, p. 246]). Most econometrics texts mention alternate procedures for Model I parameter estimation in the presence of autocorrelation (*e.g.*, see Johnston [1972, Chapter 8] and Malinvaud [1970, Chapter 13]). However, such procedures are extremely difficult to apply in practice (*e.g.*, see Godfrey [1974] and Bishop [1975]) and so may be of little aid to accounting researchers.

To alleviate the autocorrelation problem in Model I, Pierce [1977] advocates predicting each variate, based upon its own past, prior to investigating cross relationships. One means of accomplishing this is to "prewhiten" all variates individually such that the resulting y_t and x_{jt} variates in Model I are white noise time series. Prewhitened series may, however, bias the analysis to *underestimation* of relationships. Although in theory, the R^2 values between two prewhitened series can be large (see Granger [1977, p. 23]), it may be that prewhitening biases the results toward underestimation of significance, *i.e.*, non-prewhitening may *overstate* the significance, whereas prewhitening *understates* the significance. For example, in simulated outcomes, Pierce [1977, p. 16] found underestimated correlations.

Model II

If all $B_j=0$ such that each y_t variate is estimated by only its own past history, Model II reduces to a standard time series autoregressive model. Such models are widely discussed in time series and econometric literature and will not be dwelled upon here (*e.g.*, see Malinvaud [1970, Chapter 14]). The more general case when x_{jt} exogenous variates enter the model create some added complications. The major complication arises when the error terms in Model II are not a white noise series, *i.e.*, when the ε_t terms are autocorrelated. Alternative methods of analysis in such cases are "very approximate" as is noted in the "pessimistic conclusion" from Malinvaud [1970, p. 569]:

> This examination of the various possible methods for treating autoregressive models with serially correlated errors leads to rather a pessimistic conclusion. When the available series are short, none of the proposed methods allows precise estimation of the serial correlation of the errors. In these conditions, direct least squares fitting certainly gives the best estimates of the coefficients. But the distribution of the estimated coefficients cannot be determined very well. So the tests and confidence intervals are necessarily very approximate.

Resorting to first differences might alleviate autocorrelation complications, although testing for significant correlation between first differences of two series is not the same as testing for correlation between the series themselves. Also, multiple correlation R^2 is an unstable and unsatisfactory measure of relationships in first difference correlations as well, *i.e.*, see the very clever illustrations in Granger [1977, p. 22].

If autocorrelation and other problems are present in accounting variables, the obvious approach is to adopt more complex statistical designs and analysis which allow for such problems, (*e.g.*, see Nakamura *et al.* [1976] and Schoenberg [1977]). However, these tools crumble in econometric research and are likely to be even less helpful in accounting. The most serious difficulty is that demands for more and better data are usually difficult to satisfy. Also, most econometric models assume stationarity which seldom exists in accounting time series or differenced series where investments, employees, markets, laws, prices, products, economic conditions, earnings, etc. are constantly shifting. Other problems also arise. For example, suppose x (investment) is adjusted to keep y (net income) on a control path. If dynamic regression is attempted, Box and MacGregor [1970] show that the lag distribution is not identifiable.

Suggestions for Future Accounting Research

The purpose of this paper has not been to delve into the complexities of autocorrelation. Such complexities purportedly baffle even the most competent econometricians. Autocorrelation is one of many frequently neglected complications inadequately treated in accounting as well as econometrics. Although the assumption of normality is sometimes considered (*e.g.*, in the previously cited C-V-P accounted models), violation of the assumption of normality is a minor issue relative to more crucial issues of nonrandom variables, autocorrelation, nonstationarity, and lack of research controls. Monte Carlo simulation can be undertaken in varying degrees of *fantasyland realism*, but the analyst still remains in the dark regarding *real-world realism.*

We then puzzle over how accounting researchers should proceed. Although I am not optimistic about econometric forecasting, I encourage accountants to explore avenues of more complex actual cases which deal more explicitly with autocorrelation and other complications in the realworld (*e.g.*, along the lines of Elliott and Uphoff [1972]). I especially encourage future researchers to allow for judgmental adjustments necessitated by nonquantifiable factors and omitted components in the model structure. Bayesian forecasting approaches have been proposed by numerous accounting writers (*e.g.*, Dyckman [1969]). Oliver [1972] suggests using Bayesian confidence interval financial statements. Formal Bayesian schemes appear, however, to be prohibitively cumbersome in econometric forecasting (e.g., see the criticisms in Granger and Newbold [1977, esp. p. 201]). Researchers who proceed along such lines, however, may be interested in the paper of Tiao and Tan [1966].

I am more favorably impressed with the potential of applying cross-impact (*X-I*) analysis or related probabilistic forecasting approaches. The *X-I* approach is an extension of the DELPHI technique, where *X-I* is designed to account for potential event interactions and linking of a sequence of conditional forecasts. The advantage of such approaches is that human experts are more flexible and adept at seeking out and dealing with changing signals, qualitative factors, and innovative data inputs. Multiple experts are not usually constrained to the same inputs, input weightings, and forecasting procedures. *X-I* analysis allows them to retain their subjective flexibility, *i.e.*, it simply places the forecasting problem in a rational framework for obtaining and combining expert opinion. The vital elements are human, subjective, and fallible. *X-I* analysis offers a synergistic component to a systems approach and allows for forecasts conditioned upon contingent external events. Bayesian information processing might also be combined with *X-I* analysis somewhat in the same manner as with the DELPHI forecasts as proposed by Hottle [1976].

A cross-impact analysis review is provided by Duval *et al.* [1975]. An interesting research topic might be that of utilizing cross-impact analysis in adaptive regression approaches such as that proposed by Cooley and Prescott [1973] for non-stationary time series causing structural change between multivariate predictors and the criterion variate. Adaptive regression might be adapted to allow for both autocorrelation and nonstationarity. Forecasting could be greatly improved by more efficient use of human experts "tuned" to the complexities of an unstable environment.

My point is that traditional statistical inference tools are presently inadequate for most real-world accounting forecasting problems. New tools more appropriate to accounting problems should be sought after in academic research.[2] We should not be content to play with older known tools in playpens of accounting fantasyland. In some of today's "accounting" research literature, I find valuable contributions *to statistics* but little or no contributions to crucial accounting issues assumed away for convenience of analysis or inadvertently overlooked.

Accounting research is not alone in its disputes over rigor versus relevance. In a presidential address deliverered to the American Economic Association, Gordon [1976, p. 1] asserts the following:

> The title of this paper summarizes the two-fold theme to which I want to address myself this evening. First, the mainstream of economic theory sacrifices far too much relevance in its insistent pursuit of ever increasing rigor. And, second, we economists pay too little attention to the *changing* institutional environment that conditions economic behavior. We do not often enough reexamine our basic postulates in light of changes in this environment, and, perhaps more important, we shy away from the big questions about how and why the institutional structure is changing—and where it is taking us.

At a later point, Gordon [1976, p. 12] laments that this "road to salvation will not be an easy one for those who have been seduced by the siren of mathematical elegance or those who all too often seek to test unrealistic models without much regard for the quality or relevance of the data they feed into their equations." Mathematical economist Kornai [1971, p. 9] asserts:

> In the real sciences, the criterion is *not* whether the proposition is logically true and tautologically deducible from earlier assumptions. The criterion of "truth" is, whether or not the proposition corresponds to reality.

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[2] William R. Kinney, Jr., one of the reviewers of this paper, wrote that the idea of rejecting "older known tools" has been considered by auditors in statistical sampling. He noted the following:

> For example, it has been observed that accounting populations of dollars do not behave in the same way as "cows, pigs and horses" and therefore the traditional sample survey methods do not necessarily perform well in auditing (at least not without substantial adaptation). Such observations have led to the development of new statistical procedures based on "probability proportionate to size" attribute methods which specifically recognize the perculiarities of accounting error populations.

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Comments

Fantasyland Accounting Research: Let's Pretend . . . A Comment

William L. Ferrara

THIS "comment" is in no way a criticism of the basic thrust of Professor Jensen's paper [1979], for I heartily endorse his thoughts in that regard. Nonetheless, I feel compelled to say something about potentially misleading inferences derivable from his quotes and commentary concerning a section of my recent publication [1977].

The best way to make my "comment" is to quote liberally from a letter I sent to Professor Jensen after he was kind enough to send me a copy of an earlier version of his paper. These quotes are as follows:

> Your paper as well as mine are both very similar in goal, although I must admit that you do a far better job than I in terms of "sexy" titles and phrases.
>
> I deliberately and admittedly started out with a "rather simplistic case (normality of basic variables)" (p. 597), so I can see no reason to describe it as "Fantasyland."
>
> I then moved on to a less simplistic (more realistic) situation, *i.e.*, the Monte Carlo simulation" where one can estimate probabilistically both functions x and y (or the variables underlying x and y)." Through a simulation we can move toward overcoming all of the typical simplistic assumptions embodied in much of the literature you allude to. However the cost and ability to pull off a simulation is another matter as I specifically indicated. Thus, we again turn to more simplified approaches such as KS, CvM and Tchebycheff with the ultimate conclusion that we may be just as well off (maybe better off) if we used high, medium and low estimates (pp. 600–03).
>
> The real issue in applying probabilistic approaches to accounting measurement is in coming up with "cost-benefit efficient" techniques. These may often be closely related to a form of high, medium, and low analysis which might be based upon some variation of the DELPHI technique.
>
> As you can see by the above comments, I don't think we are much different in our basic attitudes concerning the use of statistical technology in accounting, especially as it relates to probabilistic approaches to accounting, measurements. If there is a difference between us, I suspect it's that I lean toward less sophisticated techniques since they are apt to be more "cost-benefit efficient," whereas you lean toward more sophistication with the hope that better statistical technology will improve decision making.

The above commentary illustrates the great difficulty (encountered by all authors) entailed in attempting to communicate ideas to others. Complete clarity to all readers (and even listeners) is impossible, for we all have built-in limitations in our message-receiving and

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sending units which yield different perceptions of what has been written (or spoken). In this regard, it would perhaps be worthwhile to keep in mind that the old adage, "seeing is believing," often functions in reverse, *i.e.*, we see only what we want to believe, or our message-receiving unit receives only what we want to receive; all else is mentally blocked out.

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Human Resource Accounting Information: A Comment Concerning Demand Characteristics

Doug Snowball

A recent experiment reported by Hendricks [1976] sought to assess the impact of human resource accounting (HRA) information on stock investment decisions. Hendricks concluded that "... in this experiment stock investment decisions were affected by the addition of human resource accounting information to conventional accounting information" (p. 300).[1] This paper questions the significance that can be attached to Hendricks's finding. Two issues—demand characteristics and the novelty of HRA data—are raised. Because the first issue is relevant to the validity of the results of any laboratory experiment, it is given most attention.

THE HENDRICKS STUDY

Hendricks's experiment involved a random assignment of graduate student subjects to two groups—Group I and Group II. Group I (the experimental group) was exposed to two treatments. For Treatment I, they were presented with conventional accounting statements for two companies, A and B, and were asked to advise an imaginary client on how best to invest $100,000 between the two companies. For Treatment II, the same task was performed, except that statements incorporating HRA data (in addition to the conventional statements) were provided to the subjects. The control group, Group II, was subjected only to Treatment II.

Hendricks's design may best be characterized as a variation of the separate-sample, pre-test-post-test design (see Campbell and Stanley [1966]). Figure 1 depicts the design where R indicates random assignment; O refers to the observation of the investment decision; and X refers to the exposure to the experimental event (the presentation of HRA data).

FIGURE 1
RO_1XO_2—Group I
$R\quad XO_3$—Group II

Typically the O_1-O_2 difference is examined only to confirm the O_1-O_3 comparison. However, Hendricks assigned the majority of his subjects to Group I and focused upon the O_1-O_2 comparison. The O_2-O_3 difference was

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[1] Hendricks also addressed the question of why HRA information might affect stock investment decisions. Because this comment questions whether the HRA information in itself had any impact on decisions, the second aspect of Hendricks's study is not discussed.

The author would like to acknowledge the comments made by Rashad Abdel-khalik and Gary L. Holstrum, both of the University of Florida.

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examined only to determine whether subjects in Group I were preconditioned by first receiving conventional statements.

Hendricks did not find a significant difference between the amounts "invested" in Company B by the Group I subjects and the Group II subjects (the $O_2 - O_3$ comparison). On the basis of this result, he concluded that Group I subjects were not preconditioned by Treatment I and used only those subjects to test his hypothesis. Under Treatment I, Group I subjects invested an average of $22,709 in Company B; under Treatment II the corresponding investment was $48,909. Hendricks attributed the change to the HRA data supplied under Treatment II and interpreted the results as a confirmation of his hypothesis.

Commendably, Hendricks referred to demand characteristics as a possible limitation of his study; however, I fail to share his belief that it is unlikely that they influenced the results obtained. The demand characteristics associated with his experiment appear to be so strong as to provide a very appealing alternative explanation for his results.

DEMAND CHARACTERISTICS

"Demand characteristics" (hereafter referred to as DCs) refers to the cues that govern a subject's perceptions of what the experimenter expects of him. According to Orne [1969, p. 146], "They include the scuttlebutt about the experiment, its setting, implicit and explicit instructions, the person of the experimenter, subtle cues provided by him, and, of particular importance, the experimental procedure itself." If subjects are aware that they are participating in an experiment, they are likely to be highly attuned to those environmental cues that, rightly or wrongly, suggest the experimenter's hypothesis. Aronson and Carlsmith [1968, p. 61] have described the human subject as "... not responding to the experimental operations per se, but ... responding to his interpretations of what behavior these experimental operations are supposed to elicit from him." In other words, aspects of the experimental environment that are irrelevant to the theoretical variable under study may be responsible for behavior changes in the direction predicted, or may obscure the expected effect and lead to systematic outcomes in an unexpected direction.[2]

DEMAND CHARACTERISTICS AND THE HENDRICKS' STUDY

Three features of Hendricks's experiment will be identified as contributing to concern over the impact of DCs. The first two are common to many other studies; it is only when considered in conjunction with the more important third feature of Hendricks's study that they become significant.

First, concern is raised by the use of *student subjects*. Student subjects frequently have had prior exposure to laboratory experiments and are especially likely to view them as games in which the players' task is to determine the true purpose of the experiment. Once "discovered," the perceived purpose may have a particularly strong biasing effect upon students' responses. Orne [1962] has stated that college students typically share the experimenter's hope that the study in which they are participating will contribute to science, and, thus, have a very real stake in a successful experimental outcome.[3]

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[2] It can be argued that DCs threaten internal validity because the impact of the theoretical experimental variable is not determinable; most commonly DCs are accepted as threatening external validity (generalizability).

[3] It should be noted that these characteristics are likely to be strongest when subjects are also volunteers. Though the empirical evidence is meager, sufficient

Second, Hendricks gave no indication that any explicit *reward system* operated within his experiment. The DCs issue is not the subjects' knowledge of the experimental purpose *per se*, but its biasing effect upon responses. As Sigall *et al.* [1970] have suggested, such biases may not emerge if subjects can be sufficiently motivated by rewards other than those associated with fulfilling the role of a "useful" subject (*i.e.*, by ensuring the "success" of the experiment).

Third, and most importantly, the specific experimental *materials and procedures* encourage the view that DCs may underlie Hendricks's results. It is difficult to imagine that even the most naive subject in Group I did not accurately detect the purpose of the experiment upon exposure to Treatment II. Though facing exactly the same task as previously, the subject had additional data available for his judgment. The data represented a substantial addition to the data supplied under Treatment I; the data were not a product of conventional accounting procedures; and, indeed, they represented an accounting innovation that is the topic of current debate among accountants. The novelty of these additional data is likely to signal that significant changes in decisions are expected by the experimenter.

This impression would have been strengthened by a closer examination of the income statements. Company A had a higher net income for both years than Company B under conventional reporting; the positions were reversed in the HRA statements presented. Similarly, Company A showed a more favorable income trend over the two years reported in the conventional statements but Company B showed superior growth in the net income reported within the HRA statements. Hendricks appropriately pointed out that the subjects merely may have used the net income figures as a basis for their responses (functional fixation). A slightly modified explanation is that the subjects used the net income figures in determining the experimenter's expectations and that their responses reflected the perceived expectations.

Both the specific materials and the experimental design employed encourage concern over DCs. Recall that Hendricks's design was characterized earlier as a separate-sample, pre-test-post-test design. Campbell and Stanley [1966] have indicated that this design, unlike the one-group, pre-test-post-test design, controls for the reactive effects of experimental arrangements. However, the same authors warn against excessive reliance on their summaries of research designs. This warning is particularly germane to Hendricks's study, for the responses of Group II provide no assurance that responses of Group I were uncontaminated by DCs. Even though Group II subjects were exposed only to Treatment II, they nevertheless were exposed to all the experimental materials presented to Group II; the only substantive difference was that no overt decision was required of them after examining only the conventional statements. In short, *ample cues were available for DCs to also influence decisions by Group II subjects.*

DEALING WITH THE PROBLEM OF DEMAND CHARACTERISTICS

Whether the results of Hendricks's study *were* biased by DCs is a matter of opinion; that his approach involved little attempt to reduce the possibility

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grounds [Goldstein *et al.*, 1972; McDavid, 1965; Rosenthal and Rosnow, 1975] exist for special concern over DCs when subjects are student volunteers. It seems unlikely that Hendricks's subjects were volunteers in the true sense of the word (see Hendricks [1974, p. 58]).

of such biases is more certain. Accordingly, Hendricks's failure to report procedures undertaken to assess the impact of DCs constitutes a serious omission. The reader is asked to rely on the fact that subjects' "... responses were kept anonymous and the subjects had no association with or obligation to the experimenter ..." (p. 297).

Orne [1970] has described a number of procedures to determine what DCs are used by subjects. Of these, both post- and pre-experimental inquiry procedures could have been employed profitably by Hendricks. The goal of both procedures is to determine the subjects' perceptions of the purpose of the experiment. However, post-experimental inquiries, even when conducted by a skilled interviewer, pose two major problems. First, subjects' responses to the post-experimental inquiry itself may be biased by DCs. For this reason, the inquiry should be conducted by interviewers who are ignorant of the true experimental purpose. Second, Orne [1962] has pointed out, "... the subject's perception of the experimenter's hypothesis is based upon his own behavior, and therefore a correlation between these two variables may have little to do with the determinants of behavior" (p. 781).

The pre-experimental inquiry described by Orne [1970] avoids this second problem. In terms of Hendricks's experiment, it would involve describing the experimental procedures to subjects (other than those intended to participate in the experiment itself), showing them the specific accounting statements and describing the decision tasks. In essence, these subjects would be "walked through" the experiment; their participation would be limited only in that a response to the investment decision task would not be required of them. The subjects, uncommitted by behavioral reactions to the experimental tasks, would then be interviewed to determine their perceptions of the experimental purpose.

DCs cannot be removed entirely from any experiment; nevertheless, careful pre-experimental inquiry (or post-experimental inquiry at the pilot study stage) might have led Hendricks to revise aspects of his study. Perhaps the ideal method of avoiding biases generated by DCs—by studying the behavior of individuals who are unaware that they are participating in an experiment—may have been difficult to accomplish in a study such as his. However, psychologists (*e.g.*, Campbell [1957, 1969]; Aronson and Carlsmith [1968]) have suggested means by which effects of DCs may be minimized. Some appear inapplicable to most accounting research (*e.g.*, the medical placebo model and the two experiments ploy), and a common approach, deception, raises serious ethical issues. However, Hendricks might have reduced the potential for bias by the use of an improved design and relatively minor changes in procedures (*e.g.*, less-transparent materials, an explicit reward system, and a focus upon sensitivity to changes in HRA data).

NOVELTY

Hendricks warned against generalizations of the results of his experiment, yet commented that "... the favorable results of this experiment should justify the additional research that would permit more general conclusions" (p. 301). The inference is that the results should strengthen beliefs that decisions made in the "real world" will be found to be affected by the presentation of HRA data within financial statements. However, given the novelty of the HRA data presented to his subjects, the inference seems unwarranted, even if the DCs issue is set aside.[4]

Few individuals presently could claim genuine familiarity with HRA data. Hendricks confined his analysis to subjects who indicated an understanding of the meaning of HRA. Yet, it is likely that most had never seen statements containing such data prior to the experiment; indeed, the subjects had read and heard little about the topic. As a result, their perceptions of the characteristics of the data (*e.g.*, perceptions of the data's objectivity, reliability and, most importantly, relevance) must have been formed primarily on the basis of the materials presented in the experiment. How they perceived the HRA data is unclear (probably to themselves as well as to readers of Hendricks's article). The only reasonably safe assumption that can be made is that the data were perceived to be *novel*. Psychologists frequently have noted the strong and varied reactions generated by novel stimuli (for examples, see the review by McGuire [1966]). Hence, the responses of Hendricks's subjects may be related more closely to the novelty of the data than to perceptions of the relevance of the data to investment decisions.

It may be argued that the subjects' responses bear some relationship to the reactions of "real world" investors to the *initial* introduction of HRA statements. However, "real world" decisions have economic consequences and reactions to novel data in such an environment are likely to be very different (*e.g.*, more cautious) than those in an experimental situation. The more important issue, though, is the impact of HRA data presented on a continuing basis; the responses of Hendricks's subjects offer no insight into either experimental or "real world" reactions once such data lose their novelty.

The novelty problem, compared to the DCs issue, presents a more formidable obstacle for research on the topic addressed by Hendricks. Careful consideration of DCs can lead to procedures that satisfactorily manage that problem; procedures designed to overcome the novelty problem are likely to represent only a partial solution or may introduce new threats to validity.[5] Ultimately, the latter concern may lead to a reluctant conclusion that behavioral impacts of drastic innovations in accounting reporting cannot be examined satisfactorily through laboratory experimentation until the changes lose their novelty.

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[4] The novelty aspect has previously been mentioned as heightening the concern over DCs; in this section novelty is discussed as impacting *directly* upon the study's external validity.

[5] The obvious procedure is to provide extensive opportunities for subjects to familiarize themselves with HRA data prior to the main experimental manipulations.

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Human Resource Accounting Information: A Reply Concerning Demand Characteristics

James A. Hendricks

Professor Snowball's comment is concerned with demand characteristics (DCs) and the novelty of human resource accounting (HRA) information in my experiment [Hendricks, 1976]. Snowball identifies three features of the experiment that contribute to his concern about the impact of DCs. The first section of this reply deals individually with the DC issues and the second section deals with the novelty issue.

Demand Characteristics

Student Subjects

Snowball's first DC concern is the use of student subjects. He asserts that student subjects often have participated previously in laboratory experiments and, thus, are likely to view them as games in which their task is to determine the true purpose of the experiment. The subjects' knowledge of the experimental purpose then may cause them to give biased responses to contribute to the "success" of the study.

The above reasoning is unsound in relation to business laboratory experiments. In the discipline of psychology, student subjects may have had frequent prior exposure to laboratory experiments because of the large number of experiments conducted. Prior exposure to business laboratory experiments is unlikely because relatively few laboratory experiments have been conducted.

Snowball correctly noted that the concern about student subjects is strongest if the subjects are volunteers. The subjects in my experiment were not "volunteers" *per se*. Entire classrooms of subjects were used, although the subjects were given the opportunity not to participate.

Therefore, in my experiment the concern over DCs related to student subjects is minimal because (1) the subjects' prior exposure to laboratory experiments was unlikely, (2) the subjects were not volunteers, and (3) the subjects' responses were kept anonymous and the subjects had no association with or obligation to the experimenter. It is unlikely that subjects participating in an experiment under the above conditions would be motivated to bias their responses to please the experimenter. As support for this position, after conducting an experiment designed to investigate the "cooperative subject," Sigall *et al.* [1970, p. 9] stated that "considering both the lack of clear evidence on cooperativeness in the literature and the results of the present experiment, we

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must conclude that the large amount of concern spent over the 'cooperative subject' problem has been disproportionate."

Reward System

Snowball's second DC concern is the lack of an explicit reward system. One purpose of the experimental reward structure is to motivate the subjects to be involved in the experimental task. The explicit reward commonly used in experiments is money. Since it would have been difficult monetarily to reward the subjects according to the quality of their decisions, a fixed dollar reward would have been necessary. Because it is difficult to determine the differing effects of a fixed dollar reward on the subjects, I elected not to use such a reward system. I did, however, watch carefully during the experiment to determine if the subjects took the task seriously. Because only one subject was observed not to be taking the experimental task seriously, it is likely that implicit rewards such as the interest of the task and the desire to make sound investment decisions were adequate to motivate the subjects to be sufficiently involved in the study.

Snowball states that Sigall *et al.* [1970] suggested that subjects' response biases can be avoided if subjects are motivated by rewards other than those associated with being a "useful" subject. A close reading of the Sigall article reveals no such suggestion. In their article, Sigall *et al.* did suggest that subjects prefer to perform effectively to enhance their self-images rather than cooperate to please the experimenter. If that is true, an explicit reward system may be unnecessary.

Experimental Design and Materials

The most important concern to Snowball about DCs was the specific experimental design and materials. In his comment, Snowball depicted my experimental design incorrectly as shown in Figure 1.

FIGURE 1

$RO_1\ XO_2$—Group I
$R\quad XO_3$—Group II

My experimental design is shown correctly in Figure 1 on page 295 of my 1976 article. Using Snowball's format, my design is depicted correctly in Figure 2 below.

FIGURE 2

$R\ \ O_1XO_2$—Group I
RXO_3 —Group II

Snowball states that the potential for bias may have been reduced by using an improved experimental design. Unfortunately, Snowball did not suggest such an improved design.

Snowball also asserts that the use of less-transparent materials might have reduced the potential for bias. He states that "it is difficult to imagine that even the most naive subject in Group I did not accurately detect the purpose of the experiment upon exposure to Treatment II." Certainly, the subjects were aware that HRA information was involved, but this does not mean that the subjects biased their results to please the experimenter. Transparency exists in many accounting studies, such as those involving replacement cost or confidence interval information. It does not necessarily follow that subjects bias their responses because they are aware of the experimental variable.

Methods of Dealing with DCs

All experiments have DCs, and DCs cannot be eliminated from experiments [Orne, 1962, p. 779]. Snowball acknowledges that the ideal method of avoiding DC response biases—observing individuals who are unaware that they are involved in an experiment—is difficult to achieve in a study such as mine. He does suggest that two procedures described by Orne could have been used profitably to determine the subjects' perceptions of the experimental purpose. As admitted by Snowball, the first method, post-experimental inquiry, is defective because (1) the subjects' answers to the inquiry itself may be biased by DCs, and (2) "... the subject's perception of the experimenter's hypothesis is based upon his own behavior" [Orne, 1962, p. 781].

The second method, pre-experimental inquiry, involves "walking" non-participating subjects through the experiment. That is, these subjects would be exposed to all experimental procedures and materials, but they would make no decision responses. These subjects would then be asked what they perceived to be the experimental purpose.

This second method avoids the problem of the subjects' perception of the experimental hypothesis being based on their own behavior. It does not, however, avoid the problem of the pre-experimental inquiry technique having its own DCs.

The subjects walking through the experiment no doubt would be able to detect that the experiment concerned HRA information. The important issue is not, however, whether the subjects can detect the experimental variable, but whether their responses in a real study would be affected by DCs. Given that the subjects have detected the experimental variable, two questions are important. First, would the subjects know whether they would have altered their responses because of DCs in a real study? If the subjects do not know wheteher their responses in a real study would be affected by DCs, pre-experimental inquiry would be useless. Second, would the subjects correctly inform the experimenter that they would have altered their responses because of DCs in a real study? The subjects may incorrectly inform the experimenter that they would *not* alter their responses because of DCs in a real study, because they may believe that is what the experimenter wants to hear. Thus, DCs are probably just as likely to exist in a pre-experimental inquiry as they are likely to exist in an actual study.

I conclude that DCs cannot be eliminated with certainty from an experiment, and that no adequate method exists to determine whether the subjects actually responded to DCs. Therefore, the best solution to DCs is to design and administer experiments in such a manner as to minimize the effects of DCs. After considering Snowball's comments, I have confirmed my belief that my experiment was so designed and administered.

NOVELTY

Snowball is concerned with the impact of the novelty of the HRA information on my experiment's external validity. However, I never claimed any external validity for the study, as evidenced by the following quotation, "Because this study was an experiment using graduate students as subjects, the conclusions of the study cannot be generalized to other deicision situations or statement user groups" (p. 301). Additionally, I said that "... the favorable results of this experiment should justify the additional research that would permit more general conclusions" (p. 301). The only intended inference is that because stock investment decisions were affected by HRA information in this experiment, the additional research that would permit generalization to the "real world" was justified. From my statement justifying additional research with HRA, Snowball makes the following inference: "The inference is that the results should strengthen beliefs that decisions made in the 'real world' will be found to be affected by the presentation of HRA data within financial statements." Snowball then says this (his) inference is unwarranted because of the novelty of the HRA data.

I do not believe that the novelty of the information was a serious threat to external validity in my experiment. Although the HRA information was new to the subjects, the historical cost model was maintained, human assets were defined, and the amounts capitalized and amortized each year were explained. Thus, the HRA information was probably not that novel or difficult to interpret for subjects with an average background of 8.2 finance and accounting courses. In addition, those subjects who responded that the meaning of any item(s) on the financial statements was unclear were excluded from the analysis.

Snowball states that to cope with the novelty issue "the obvious procedure is to provide extensive opportunities for subjects to familiarize themselves with HRA data prior to the main experimental manipulations." But, as he recognizes, this procedure would be a severe threat to internal validity. As with his comments on the design of the experiment, Snowball offers no solution to the novelty issue. He concludes that we may not be able to examine satisfactorily in laboratory experiments the behavioral aspects related to "drastic innovations in accounting reporting."

I cannot accept Snowball's conclusion for two reasons. First, as explained above, I do not believe that novelty is a serious problem if handled properly. Second, the purpose of a lab experiment is not to generalize conclusive results to the real world. The lab experiment is an exploratory study affording control over extraneous variables so that the behavioral impact of a complex variable may be examined. Favorable results in a laboratory experiment justify the additional research that permits generalizing to the "real world."

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A Comment on Motivational Considerations in Cost Allocation Systems: A Conditioning Theory Approach

Bikki Jaggi

MOTIVATIONAL considerations, which have been primarily associated with budgets in the accounting area [Becker and Green, 1962; Stedry, 1960; Cherrington and Cherrington, 1973; Ronen and Livingstone, 1975, Hays, 1977], were introduced to the cost allocation process by Bodnar and Lusk [1977]. They have proposed a model which sensitizes the allocation of joint costs to non-financial organizational goals. For modifying the traditional cost allocation basis hitherto solely influenced by the firm's financial considerations, an operant conditioning theory approach has been suggested. The authors contend that the proposed process will structure the organizational environment so that multiple sources of reinforecement contingencies will motivate desired subunit behavior [p. 866].

I will critically evaluate the assumptions and constructs of the proposed model and point out problems associated with its implementation. The purpose of this evaluation is not to underestimate Bodnar and Lusk's contribution, but to warn readers of its limitations. There is an inherent risk of not motivating subunit participants for better performance, if appropriate conditions are not present.

EVALUATION OF ASSUMPTIONS

The proposed model implies that:

1. The operant conditioning theory provides a valid approach to motivate individuals for better performance,
2. The operant conditioning theory approach is also valid for affecting group behavior.

Validity of Conditioning Theory Approach

Though the operant conditioning theory was originally introduced in 1953 [Skinner, 1953], there is not enough empirical evidence to support the validity of this theory in industrial environments. Most of its applications are in the mental health (*e.g.*, see Allyon and Azrin [1965] and Wolf, Riley, and Mees [1967]) and educational environmental settings (*e.g.*, see Hanblin, *et al.* [1967]). Since the participants' behavior observed in these

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settings may be far less complex than that of participants in industrial organizations, the evidence obtained from these applications may not be valid for industrial environments.[1] Furthermore, the theoretical constructs of the operant conditioning model[2] have come under severe criticism;[3] Argyris [1971] and Whyte [1972] are its two main critics.

Argyris does not consider that the operant models can be successful in non-laboratory situations unless certain conditions are met. These conditions are:

1. the recipient of the reinforcement will interpret the reinforcement precisely as intended by the reinforcer; the recipient will not add his additional meanings to any given reinforcement;
2. the recipient will not add up reinforcements to generate a history of the relationship which, in turn, could give new meaning to the relationship;
3. the recipient will not discuss the reinforcement program covertly or overtly, knowingly or unknowingly, with any one else or himself [p. 556].

Argyris cites a case in which non-fulfillment of these conditions resulted in failure of the operant program. In view of these conditions, Argyris doubts that the model will work in the non-contrived world.

Whyte also expressed skepticism about the validity of the conditioning theory in the actual world. To use his words, "... my experiences in industry have led me to conclude that when we move out of the laboratory into the complexities of real life, Skinner's operant conditioning theory tells us very little about prediction and control of behavior [p. 66]."

Whyte considers that four crucial elements relating to real life behavior have been omitted from the basic operant model, as a result of which the conditioning model may not become operational. First, practical problems exist in defining and measuring complex behavior and in making determinations about the level of worker satisfaction that can be achieved through the use of reinforcements. These make it difficult to dispense positive reinforcements in work organization. Second, work situations often present conflicting stimuli, which result in producing reward from one group and punishment from another at the same time. Third, the time lags between performance and rewards may make the environmental contingencies more difficult to manage. Fourth, the operant model does not contain a provision for the contingencies of reinforcement relating to the control of behavior of the persons which reinforces other employees. Jablonsky and DeVries [1972] also noted that the last element was missing from Nord's [1969] model and proposed a multiperson exchange model to overcome this shortcoming.

In view of the above comments, the usefulness of the Bodnar-Lusk model will depend upon the environments which meet several conditions and assumptions discussed by the critics of the operant conditioning theory.

Validity of Operant Conditioning Theory to Group Behavior

Skinner's original theory was based on human psychology and was developed to understand the learning process and motivation of *individual behavior* by reinforcing desired outcomes. An experimental study was conducted to examine the conditions of training that influence the acquisition and decay of *group behavior* [Glaser and Klaus, 1966].

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[1] For potential applications of conditioning theory in organizations see Nord [1969].

[2] Based on the operant conditioning principles, Nord [1969] and Jablonsky and DeVries [1972] have developed models of individual behavior in organizations.

[3] A detailed criticism of the operand conditioning model has also been presented by Schneier [1974].

This experiment was conducted on a group called *team*. "In contrast to a small group, a team is highly structured and follows relatively formal operating procedures, for example, a submarine crew or a baseball team. A small group, on the other hand, is less formal and has few specialized individual tasks, for example, a jury or a committee" [p. 1].

The results of the first part of the study in which team reinforcement was contingent upon correct responses from all team members, indicated that "changes in team performance conformed to predictions made on the basis of knowledge of individual organism behavior when the occurrence of reinforcement is controlled following each response [p. 22]." The results of the second part of the study, which investigated teams with a parallel structure where the reinforcement contingencies were made more complex, indicated "that the reinforcement contingencies set up by the structure of parallel team could result in a performance decrement as a function of team arrangement and the probability of correct responses by team members" [p. 22].

This experiment provided evidence that the team performance is a function of not only environmental conditions, but also internal conditions, such as, communications, structure, processing procedures, *etc*. Thus, the usefulness of operant conditioning theory depends upon proper coordination and control of internal conditions, which implies that the success of the Bodnar-Lusk model will be influenced greatly by how arrangements are made to coordinate and control subunit activities.

EVALUATION OF THE MODEL

One of the basic components of the model is the contingency of reinforcement, which emphasizes the relationship between behavior and its consequences. These consequences refer to the changes or outcomes in an individual's environment. Though it is not explicitly mentioned in the model, it is assumed that the proposed model will result in changes in environment to control the future occurrence of individuals' specific behavior. In the illustration given by Bodnar and Lusk, the contingency of reinforcements ultimately will refer to the relationship between individual faculty members' publications and the consequences resulting from these publications. The final consequences will not be the allocated joint costs, but some kind of reward or compensation to individual faculty members which will motivate them to continue producing research publications. According to the operant model, the desired behavior will occur with greater frequency if possible consequences are tied to participants' behavior. Thus, rewards to individual faculty members will have to be closely linked to their behavior.[4] This discussion suggests that cost allocations, in themselves, cannot serve as reinforcers. Instead, the model based on the operant conditioning theory needs to be modified to show linkage between participants' behavior, cost allocation and reinforcement.

It also needs to be pointed out that cost allocations may be used for purposes other than control.[5] For example, fair cost allocation may be required to determine the price of a contract, such as a defense contract. Therefore, the allocation of costs will be guided by the principles of fairness. Fairness, in such situations, may require the use of a mandatory allocation base (CASB). In other cases, a least disputed or mutually agreed upon base may be used. As a result, two allocations may become necessary—one for motivation and control and the other for fair allocation of costs. Consequently, there will be two versions of the reinforcer, which are likely to give conflicting signals. Unless the cost allocation model can handle this type of situation, the reinforcer may lose its ability to condition behavior.

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[4] This close relationship between rewards and behavior has been established by several empirical studies. For example, refer to Jorgenson, Dunnette and Pritchard [1973].

[5] The author gratefully acknowledges an anonymous referee's contribution of pointing out the weakness of the proposed model with regard to the issue discussed in this paragraph.

IMPLEMENTATION PROBLEMS

Apart from the fundamental issues of the validity of the operant condition theory to motivate individual and group behavior and suitability of the theory for cost allocation systems, several problems are associated with implementation of the model proposed by Bodnar and Lusk. Some important problems include (1) schedule of reinforcement, (2) degree of reinforcement, and (3) role of punishment.

The schedule of reinforcement refers to the frequency of dispensing the reinforcement. Should reinforcement be dispensed on a continuous schedule in which every appropriate behavior is followed by reinforcement or on a variable ratio schedule. In a variable ratio schedule the number of desired responses varies around some average ratio. Yukl, Wexley, and Seymour [1972] conducted an experimental study to examine the impact of continuous and variable ratios. They found that variable ratios of reinforcement were more effective in sustaining increased production in simulated work situations. In the case of a cost allocation model based on the operant conditioning theory, continuous reinforcement may not be practical. Therefore, a variable schedule will have to be developed, according to which subunit participants are provided with reinforcement at some intervals. This will mean that costs will have to be allocated at regular intervals during a year depending upon the nature of the organization and practical difficulties involved in allocating costs.

The degree or magnitude of reinforcement will have to be examined in terms of individual satisfaction. Should a reinforcement be given until the individual is fully satisfied? Weissenberg [1975] has pointed out that placing stress on satisfying an individual by providing reward until satisfaction is reached will not necessarily encourage the individual to keep performing at a desired level. It is contended that only partial or temporary satisfaction by means of available rewards will create optimal conditions for the continuous emission of the desired behavior by participants seeking rewards. Therefore, it is important that in the design of reinforcement schedules the degree of rienforcement is also properly controlled.

Bodnar and Lusk have stated, "... that subunit financial performance is evaluated and either rewarded or sanctioned as is appropriate [p. 861]." Rewards represent positive reinforcements and are dispensed to increase the frequency of the desired behavior. Sanctions are punishments, which are used to control behavior or to discourage the occurrence of the preceding undesirable behavior. Punishment can take several forms, but the most common form is disciplinary action. Some authors have pointed out that punishment is being over-emphasized and is frequently misused. The authors suggest that in order to make it work, it should be prudently used [Johnston, 1972; Luthans and Kreitner, 1973]. The weakness of punishment is that it leads to escape attempts, which manifest themselves as tardiness, absenteeism, and high turnover. Further, the undesirable behavior is not always extinguished but often is merely suppressed by punishment. Since punishment is not likely to motivate participants toward a desired behavior, sanctions should be avoided so far as possible, and the emphasis should be placed on positive reinforcements.

CONCLUSION

The above evaluation has pointed out the lack of empirical evidence to support the validity of the operant conditioning theory, especially as a motivating force for group behavior. Because the success of the theory is dependent upon several conditions and assumptions, its usefulness in the real world has been greatly reduced. Thus, the proposed model's motivating subunit behavior will only be accomplished if several conditions and assumptions are met.

Though not explicitly mentioned, it has been assumed that the model links the subunit participants' behavior with the organizational goals through some kind of a reward system for the subunit participants. An empirical test is required to examine the validity of using the joint allocation process as a link between non-financial organizational goals and subunit participants' behavior.

If the model proposed by Bodnar and Lusk is to be used, attention should be given to implementation problems. To increase the frequency of the desired behavior, a proper coordination and control of the schedule and degree of reinforcements will be highly desirable. In addition, positive reinforcements are likely to be more appropriate for increasing this frequency.

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Operant Conditioning: A Discussion of Its Relevance Regarding Institutional Control

George Bodnar and Edward Lusk

We wish to thank Professor Jaggi for his comments and for providing us an opportunity to discuss in greater detail (1) the validity of the conditioning theory approach, (2) the evaluation of the proposed model, and (3) the implementation problems of the proposed model.

VALIDITY OF THE CONDITIONING THEORY APPORACH

Jaggi suggests that the theoretical constructs supporting the operant conditioning model have come under severe criticism and have thereby cast doubt on the model's validity. It seems appropriate to provide a brief description of these theoretical constructs before critiquing the criticisms leveled against them.

Elements of the Operant Conditioning Model

Organizational behavior is frequently viewed in the ahistorical, humanistic perspective of such men as McGregor [1960], Maslow [1965], and Herzberg [1966]. This perspective postulates that individuals have an essence or intrinsic nature which is only congruent with certain environments. Motivation is generally described in terms of a drive to satisfy one's internal states or needs, as in Maslow's hierarchy or Herzberg's two-factor theory of worker satisfaction. Behavior is primarily explained in terms of mental processes which are unobservable, and secondarily in terms of observable environmental factors. This approach seems to be generic to accounting research which utilizes an "expectancy theory" framework [Rockness, 1977; Ronen and Livingstone, 1975; and Caplan, 1971].

Expectancy theory holds that behavior results from a decision-making process in which it is assumed that

1. Individuals place different values (ordinal or cardinal) on different outcomes.
2. Behavior results from decisions made by the individual after considering the relationship between the various decisions and the values of those decisions.

In contrast, conditioning theory does not postulate metaphysical assumptions concerning the nature of the individual. Conditioning theory holds that all behavior may be pragmatically explained in terms of the history of interactions between an organism and its environ-

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ment. Conditioning theory maintains that purposive connotations, such as needs or drives, add nothing to the scientific analysis of behavior [Skinner, 1969, p. 224].

In order to adapt, an organism needs to learn (1) the meaning of stimuli, and (2) the consequences of responses. The distinction between the meaning of stimuli and the response consequence is the major difference between classical and operant conditioning. Classical conditioning, frequently termed "stimulus substitution," is concerned with the pairing of a new stimulus with a response which is already known to be elicited by a certain stimulus (the unconditioned stimulus). Operant conditioning, frequently termed "response selection," is concerned with the development of a new strength for an emitted response. Under operant conditioning, a reinforcing stimlus is presented only after a response has been emitted. The stimulus which evoked the response is unknown; this is not the case under classical conditioning. In the terminology of operant conditioning, an "operant response" is a response or a category of behavior which is emitted rather than elicited in that the effective stimulus is unspecified [Marx, 1970, p. 50]. The class of responses upon which reinforcement is contingent is called an operant, to suggest the action on the environment followed by reinforcement. Under classical conditioning, the organism learns the meaning of stimuli; under operant conditioning, the organism learns which responses are reinforced.

In the operant conditioning framework, when a response occurs and is reinforced, the probability that it will occur again in the presence of similar stimuli is increased. Any stimulus present when an operant is reinforced acquires control in the sense that the probability of that response occurring is increased when it is present. Such a discriminative stimulus does not act as a goad; it does not elicit the response in the sense of forcing the response to occur. It is simply an essential aspect of the occasion upon which a response is made and reinforced.

The operant conditioning model views environmental factors as the primary cause of behavior. The control of behavioral change (*i.e.*, motivation) in volves changing the probability of responses through reinforcement techniques. Reinforcement may be positive, negative, or neutral. Under conditions of positive reinforcement, the response produces a consequence that results in an increase in the frequency of the response. It is commonly stated that such a consequence is "pleasing" or "rewarding." However, operant conditioners avoid such inferences and define positive reinforcers as stimuli which increase the probability of a response. Skinner [1969, p. 58] notes that "the mere frequency with which a reinforcer occurs is much less important than the contingencies of which it is a part."

Applicability of the Proposed Model in Organizational Control Situations

Professor Jaggi suggests that there is a lack of empirical evidence to support the theory of operant conditioning in industrial environments. Furthermore, he suggests that evidence of validity in other environments (mental health, education) is not transferable to industrial environments.

Several comments may be made. First, behaviorism is the main-stream of psychological research [Braginsky and Braginsky, 1974]. There is a mass of evidence supporting conditioning theory, albeit mostly from laboratory studies. Critics claim that the artificial behavioral context of laboratory studies makes research results ambiguous and, thus, not transferable out of the laboratory situation.[1] Proponents hold that this is the objective of psychological research. They argue that diverse behavior has objective similarities and these "laws" can only be observed in laboratory environments under scientifically controlled conditions.

The basic question may be stated as, "What is an adequate description of the behavioral interrelationships represented by the decision making process?" Whyte's [1972] criticisms, for example, wholly concern omissions of the operant conditioning model. Jaggi cites four points made by Whyte. The first point concerns *satisfaction*, the second distinguishing *rewards* from *punishments*, and the third is the time lags between performance and *rewards*. Each of the underscored terms connotes inner states which are specifically omitted from the conditioning theory model *because they are unobservable*. It hardly seems fruitful to organize a control system based upon unobservable variables.

Whyte's fourth point, however, is relevant and represents the major criticism against conditioning theory. But this criticism does not concern model validity; it addresses the morality of the application of the operant modeling approach. Consider a typical laboratory study in which one observes controlled behavior. Theoretically, both the observed and the observer are conditioning each other. But it is known that one party has designed the situation, while the other participates in it. If behavior is a function of environmental factors, cannot one accuse the observer of manipulating the participant? Much the same criticism may be leveled against control effected by central management creating stimuli which goad decision makers to follow a particular course of action (expectancy theory).

In the same sense, structuring cost allocation on the operant conditioning paradigm raises an ethical question concerning the morality of a central authority instituting a procedure which controls behavior in a scientific, *i.e.*, impersonal, sense. Operant conditiong-ing has revived a debate in psychology akin to the philosophical issue of "free will versus determinism" in human behavior [Rogers and Skinner, 1956]. Thus, the question of validity appears to be a question of values, and in that sense is situational.

EVALUATION OF THE MODEL

The comments in this section will be directed at supporting the appropriateness of the model, rather than its validity. As a discriminative stimulus, a rule is effective as part of a set of contingencies of reinforcement. The suggested allocation model is essentially a rule derived from the contingencies which describe the cost allocation process. The exogenous specifications come from two sources. The first source is the accounting system; it provides the operational data pertinent to cost allocation. This information is used to construct the constraint set. The second source of exogenous specifications is management. Through the development of behavioral weights management may design the allocation process given its perception of the organizational situation. This behavioral weighting is consistent with the notion that normative allocation criteria do not exist [Demski, 1973]. Therefore, as Vatter [1945, p. 173] has put it, "It is but logical that there be some expression of managerial viewpoint in the accounting system." The suggested model gives management a definitive role in selecting cost constructs. Operant conditioning provides the paradigm for suggesting that these constructs will have desirable motivational properties.

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[1] This issue has previously been explored in an accounting context. See Jensen [1970] and Fertakis [1970].

While the relative role attributed to environmental factors varies in the theories mentioned above, environmental factors are the most objective factors influencing behavior and are likely to be subject to the greatest amount of control in an organization. Cost allocation directly influences the financial environment of the organization and the operant conditioning framework directly modifies the financial environment. This direct modification of the financial environment is one of the most desirable features of the operant conditioning model suggested.

Another important feature of the operant conditioning paradigm is its parsimonious use of model variables. Emshoff [1971] holds that much of the disappointment with behavioral research stems from the tendency to introduce complexities into a behavioral situation rather than beginning with simplified models. It is believed that a model which encourages parsimony in the selection of model variables is desirable in developing control in an environment of functional subunits, such as responsibility centers.

In providing for cost allocations with the operant conditioning paradigm, the following points are suggested:

1. Responsibility centers may be viewed in the abstract as organisms, and at a finer level as groups of people. Our analysis herein is at the former level, although there is evidence supporting the notion of group conditioning [Glaser and Klaus, 1966]. Subunits, rather than individuals, have been the unit of analysis in theories of organizational power [Hickson *et al.* 1971] and conflict [Walton and Dutton, 1969].
2. A detailed analysis of group interactions must certainly be situational. In addition, the introduction of unnecessary complexities into a behavioral situation often obscures an analysis of the basic control relationships.
3. In accepting a rational, scientific model of behavior control, care must be exercised that the purpose of control, *i.e.*, monitoring performance relative to the goals of the system, must be specific and identified.

The control process suggested in this study has as its objective the structuring of an organizational environment in which multiple sources of reinforcement contingencies motivate desired subunit behavior. The appropriateness of subunit behavior is usually related to a set of well-established goal measures (*i.e.*, profit maximization). The cost allocation process provides an additional source of reinforcement contingencies for motivating behavior relative to this behavioral criterion. The appropriateness of the set of goal measures is central to the value of the suggested allocation process.

IMPLEMENTATION PROBLEMS

Jaggi's comments on implementation problems, similar to his comments on validity, focus on questions of inner states (*i.e.*, satisfaction), and not on the mechanics of the model itself. The major problems seem to stem from the fact that allocating a fixed sum is necessarily a zero-sum game. The suggested model does not alter this consequence; rather, it attempts to explain this consequence in terms of non-financial output measures.

Whether this cost allocation system is considered as a reward or punishment system will depend upon the perception of the individual subunits. For example, subunits receiving the lowest-cost assignments possible may consider this as a reward system, while subunits receiving relatively high assignments may view this as a penalty system. That no norm characteristic of the perception of the reinforcement stemming from the allocations is possible is much less important than the contingencies of which the reinforcement is a part. Under the principles of operant conditioning, it is not necessary to infer that reinforcement be "pleasing" or "rewarding." The fact that reinforcement is contingent upon a class of responses is sufficient to maintain and generate a great deal of activity [Skinner, 1969]. However, this should not be taken to mean that the nature of the reinforcement is unimportant. The reinforcement must be logically related to the activity to be controlled. Establishing neutral reinforcements will not be effective in developing a strong conditioning bond. Again, the perception of the members of the functional subunit is important. For this reason, the reinforcement system has been associated with the *financial* performance of the subunit. Selecting the financial dimension of the subunit to establish reinforcement was done because it has been shown [Lusk and Oliver, 1974] that financial goals (principally high productivity, organizational efficiency, and profit maximization) are consistently considered *important* to managers of the subunit and are perceived by these managers as important to the *success* of the organization.

Since the financial dimension seems to be a consistent and important factor in the manager's judgment of individual and organizational success and the reinforcement system can be financially oriented and sensitized to non-financial performance, the operant conditioning model seems ideally suited to creating an effective control environment.

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Management Strategy in a Large Accounting Firm: A Comment

Kenneth Brooks and Richard Schroeder

BAKER [1977] in his recent article "Management Strategy in a Large Accounting Firm" attempted to ascertain the existing management strategy of a public accounting firm. He then went on to develop a model of this management strategy which by implication is presented as a generalized model for all firms. "... [A] model of the manner in which a *successful* public accounting firm manages a complex and changing environment has been developed" [Baker, 1977, p. 579] (emphasis added). The purpose of this comment is to raise two issues. The first is related to the methodology itself, and the second is related to the relationship of Baker's model to previous research.

The participation observation method, though not extensively utilized in the field of accounting, is recognized as a credible technique for the development of understandings concerning complex social settings and relationships. The philosophical grounding for the approach is the assumption that a viable avenue for examing such an organizational setting is through immersion of the researcher into the milieu of the social interaction. Given Baker's objectives, the methodology is clearly acceptable and possibly laudable as an innovation. The appropriateness of the implementation of the methodology is less axiomatic.

The major criticism of Baker's methodology has traditionally been the potential bias of the observer. Given the nature of the technique, it would be possible for the observer tendentiously or unwittingly to screen and order the observations to fit preconceived notions or hypotheses. There are at least two ways to offset this weakness. Bogdan [1972] recommends the avoidance of an observer with expert or professional knowledge directly applicable to the situation. An alternative approach would be to have a second person who is not expert in the field examine the written observations and derive independent findings that could be compared. Either approach would be a substantive effort to negate the bias issue. In any event, Baker ignores this issue and fails to report on any attempts to control for observer bias.

The technique also requires a longitudinal view of the organization in as complete an array of situations as possible. Given the complexity of public accounting firms, it is questionable as to whether observations over a brief period are sufficient. This concern is compounded by the decision not to observe during the busiest part of the firm year. All of the firm activities which Baker

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describes are on-going activities, and the time frame chosen is not representative of the total experience of public accounting firms. It is also not evident that an effort was made to observe the full range of firm activities rather than just those involving ranking professionals beginning with "the member of the firm at about 9:00 a.m. in the accounting member's office." Many of the activities of a public accounting firm occur in a client's office or in other settings external to the firm. It is essential that the totality of the organization impinging on the research question effort be examined. Baker's approach makes it possible that he was allowed to observe only those activities desired by the management of the firm.

The process of participant observation has been rather explicitly outlined by Diesing [1971] and was touched upon by Baker. The three steps are as follows. First, the observer becomes socialized into the system, learning roles, normative elements, routines, and relationships. The observer must become a neutral figure, an unobtrusive part of the scene. Second, the researcher records observations and finally constructs hypotheses about the system formulated out of recurring themes in the observations. The hypotheses and/or model are continually checked with new observation data and refined. These last two steps are cyclical and interactive until the researcher is satisfied with the validity of the hypotheses and/or model. Clearly, this process was not followed in the project reported, nor were deviations from the process justified by the author.

These three primary concerns with the manner in which Baker implemented his methodology—effect of observer bias, lack of breadth of observations, and the nature of model formulation and testing—cause the findings to be subject to question. The participant observation technique is not the issue. The process of implementation is.

Additionally, Baker's implication that his is a general model is subject to question, and his failure to compare findings with previous research is a weakness. When Baker states that he observed the management strategy of a *successful* large public accounting firm, he is implying that all successful firms employ this strategy, and since there are many successful firms (at least in terms of generated revenues), the management strategy of many firms must be similar to this model. The use of an individual observation to draw generalized conclusions is a tenuous assumption at best, but when Baker completely ignores all previous research on the nature of the organization and strategy of public accounting firms, he provides little support for his conclusions.

There has been precious little research on the nature and performance of public accounting firms, but the researcher who gains access to an organization and then fails to discuss findings in relation to existing research does a disservice. Even given the limitations noted above, Baker may have outlined new avenues of inquiry and provided evidence of conflicts between previous work and his own which should have been discussed.

Two examples serve to illustrate the conflicts between Baker's model and previous research. Baker [1977, pp. 579–580] states that "Doing . . . those activities which the firm undertakes to maintain and improve its relationship with its client" include tax preparation and planning, management consulting, training of and search for qualified executives, advice and expertise in matters before governmental agencies, and ready access to securities markets through unqualified financial statements. However, in describing changes in the equilibrium condition which affect the Being strategy (the image of the firm), he discusses only the responses of public accounting firms which relate to the attest function.

On the other hand, Montagna [1974] hypothesized that the multiplicity of tasks inherent in the varied role of the large-firm accountant has introduced an element of uncertainty into the practice of public accounting and that the uncertainty created by these various roles is the most significant impetus for change in public accounting. Does Baker disagree with Montagna's premise? The reader is left to his own devices to reach a conclusion.

Second, Sorensen [1967], Sorensen and Sorensen [1972], and Schroeder and Imdieke [1977] have all shown that individuals in public accounting firms tend to become more organizationally oriented, as opposed to professionally oriented, as they rise in the firm's hierarchical structure. The results of these three studies would tend to indicate a management strategy of certainty in dealing with alternative financial statement presentations, because the firm can set policies and expect them to be followed. How do the results of these studies fit into Baker's model? He may have achieved different results, but a comparison of results with these of earlier studies would have been useful.

In summary, Baker is to be commended for the attempt to utilize a previously untried technique in analyzing an accounting firm; however, limitations in methodology and failure to relate his work to previous studies raise questions about the reliability of the results.

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Management Strategy in a Large Accounting Firm: A Reply

C. Rickard Baker

I would like to thank Professors Brooks and Schroeder for their comments on my article, "Management Strategy in a Large Accounting Firm." However, I would like to point out that few of their comments may be validly sustained.

The major portion of Brooks and Schroeder's comments may be answered by the fact that, due to editorial constraints, an article in THE ACCOUNTING REVIEW is limited to approximately 20 typewritten manuscript pages. This is unfortunate in that as much may be left out of an article as is included. I believe that most of Brooks and Schroeder's comments would be answered by referring to the following materials by me published elsewhere: "A Relational Analysis of Structure in Complex Organizations: The Case of the Large Accounting Firm," doctoral dissertation (University of California, Los Angeles, 1975). "The Structural Response of the Large CPA Firm to Its Environment." *International Journal of Accounting Education and Research* (Spring 1977). "An Observation Study of a Large Public Accounting Firm," *Human Relations* Vol. 30, Number 11 (1977). "Structure in Accounting Research," chapter n *Progress in Cybernetics and Systems Research* Vol. V (Washington, D.C.: Hemisphere Publishing Corp., 1978).

In particular, I would like to reply that the problem of observer bias was in no way ignored during the progress of my research. While I did not employ a second observer, as Brooks and Schroeder suggest, I did, in fact, employ a second person who fully examined written and oral observation materials and who helped develop independent findings. Furthermore, the findings were validated by persons in the observed firm.

In regard to the comment that the time frame chosen was not appropriate, I would respond that the time frame chosen was probably the most appropriate of any that could have been chosen, in that it was a cross-section of all of the activities that the firm is engaged in and not merely auditing. The full range of activities was observed, including field auditing situations. Indeed, it was found that observing field auditing was not particularly helpful towards developing an understanding of management strategy, and that it was only in the office environment that such strategy was fully revealed. Although it was imperative that client confidentiality be maintained, there were no impediments placed in the way of observation by management of the firm.

The original research to which this reply pertains is not in any way related to the firm of Coopers & Lybrand. The opinions contained in this reply are solely those of the author.

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Regarding the comment that Diesing's methodology was not followed, I would reply that, on the contrary, Diesing's method was followed explicitly and completely.

I do not believe that I implied that all successful firms follow the same strategy which I observed. In fact, the paper specifically indicates that this was a model of *a* successful firm, not all successful firms. Nevertheless, through subsequent investigations, I have no reason to believe that other successful firms do not employ a strategy which is quite similar to that described.

Regarding the comment that I ignored previous research, I have two replies. First, it is not at all true that I ignored previous research, as a reading of the literature review chapter of my dissertation will clearly reveal. Second, it is my belief that previous research had little to offer in the way of informative knowledge in the area that I was investigating.

Regarding the comment that I discuss only the responses of public accounting firms which relate to the attest function, this was precisely the point of my article; that is, the management strategy of the large accounting firm is to preserve the credibility of the attest function while nevertheless providing a tangible product to its clients.

I have no quarrel with Montagna's notion of uncertainty in the environment of the large accounting firm. I believe I demonstrated where the uncertainty comes from and why it occurs. Sorensen's concept of bureaucratic orientation takes no cognizance of structural imperatives or environmental forces and was, therefore, not helpful.

MANUSCRIPTS ACCEPTED FOR FUTURE PUBLICATION

(ACCEPTED BETWEEN MAY 2 AND AUGUST 15, 1978)

Main Articles

Ross L. Watts and Jerold L. Zimmerman, "The Demand For and Supply of Accounting Theories, The Market for Excuses"

Lawrence Revsine, "Technological Changes and Replacement Costs: A Beginning"

David Dittman and Prem Prakash, "Cost Variance Investigation: Markovian Control Versus Optimal Control"

Moustafa F. Abdel-Magid, "Toward A Better Understanding of the Role of Measurement in Accounting"

Basil S. Yamey, "Compound Journal Entries in Early Treatises on Bookkeeping"

Enrico Petri and Jack Gelfand, "The Production Function: A New Perspective in Capital Maintenance"

Notes

Donald R. Nichols, Jeffrey J. Tsay, and Paula D. Larkin, "Investor Trading Responses to Differing Characteristics of Voluntarily Disclosed Earnings Forecasts"

Comments

W. Bruce Johnson, "A Test of the Expectancy Theory of Motivation in An Accounting Environment: A Comment"

Jesse F. Dillard and James Jiambalvo, "Expectancy Theory in a Budgetary Setting: A Comment"

Shu S. Liao, "The Effect of the Separation of Ownership from Control on Accounting Policy Decisions: A Comment"

NOTE: Manuscripts are listed in the chronological order in which they were accepted.

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American Accounting Association

Committees 1978–79

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William R. Kinney, Jr., University of Iowa
Donald A. Leslie, Clarkson, Gordon & Co., Toronto
Robert J. Swieringa, Cornell University

COMMITTEE ON CARTER SCHOLARSHIPS

Charge: 1. To develop a plan to collect applications for the Carter funded student scholarships.
2. To recommend amounts of stipends.
3. To rank applications and to transmit the ranking to the Truestes of the fund.

William B. Barrett, University of Arizona, Chairman
Loudell O. Ellis, University of Alabama, Birmingham
Carol Inberg, California State University, Hayward

COMMITTEE ON COMPETITIVE MANUSCRIPT AWARDS

Charge: To select recipient(s) of the American Accounting Association's Competitive Manuscript Award.

Gerald A. Feltham, University of British Columbia, Chairman
William Steve Albrecht, Brigham Young University
John B. Barrack, University of Georgia

A. Gregory Buckman, California State University, Hayward
Edward N. Coffman, Virginia Commonwealth University
Robert Libby, University of Chicago
Ross L. Watts, University of Rochester

COMMITTEE ON COST ACCOUNTING STANDARDS

Charge: 1. To maintain liaison with the Cost Accounting Standards Board and to advise the Board on accounting matters on its agenda.

2. To establish and maintain liaison with other committees and agencies involved in the process of developing or codifying cost accounting practices.

Werner G. Frank, University of Wisconsin—Madison, Chairman
Lawrence A. Gordon, University of Kansas
John Lere, University of Minnesota
Richard F. Ortman, Creighton University
William M. Voss, Ohio University

AMERICAN ACCOUNTING ASSOCIATION—DELOITTE, HASKINS & SELLS WILDMAN MEDAL

Charge: To administer the John R. Wildman Medal in accordance with the terms of the grant from the Deloitte, Haskins & Sells Foundation.

Ross Skinner, Clarkson, Gordon & Co., Chairman
Robert Elliott, Peat, Marwick, Mitchell & Co.
Arthur R. Wyatt, Arthur Andersen & Co.
James Loebbecke, Touche Ross & Co.

COMMITTEE ON DOCTORAL CONSORTIUM

Charge: 1. To plan and conduct the 1979 Doctoral Consortium.
2. Upon approval and funding, to arrange to have the consortium conducted and administered.
3. To report on its results and effectiveness by November 1, 1979.

Thomas R. Hofstedt, Stanford University, Chairman
David H. Downes, University of California, Berkeley
Robert S. Kaplan, Carnegie-Mellon University
Joseph G. San Miguel, Harvard University
Robert J. Swieringa, Cornell University

ADVISORY COMMITTEE TO THE DIRECTOR OF EDUCATION

Charge: 1. To co-ordinate the programs at the national and regional levels for the advancement of accounting education..

2. To act as liaison between the national and regional organizations in all matters relating to accounting education.

3. To recommend ways to eliminate duplication of effort and to mount programs to serve needs or goals not yet met.

4. To engage in other projects mutually agreed upon between the Association's Director of Education and the representatives of the Regions, and approved by the Association's Executive Committee.

Leon E. Hay, Indiana University, Chairman, *ex officio*
Canadian Region—Lawrence S. Rosen, York University
Mid-Atlantic Region—Gail A. Shaw, West Virginia University
Midwest Region—Al Richards Elam, University of Missouri, Columbia
Northeast Region—Paul Janell, Northeastern University
Ohio Region—Charles G. Carpenter, Miami University
Southeastern Region—Harvey S. Hendrickson, Florida International University
Southwestern Region—Paul A. Dierks, University of Texas, Arlington
Western Region—Benjamin L. Smith, University of Nevada, Reno

COMMITTEE ON FINANCIAL ACCOUNTING STANDARDS

Charge: To maintain close liaison with the Financial Accounting Standards Board, the International Accounting Standards Committee, and other authoritative bodies in financial accounting by submitting position papers to them and by engaging in other related activities, such as making presentations at their public hearings.

William H. Beaver, Stanford University, Chairman
A. Rashad Abdel-khalik, University of Florida
Ronald M. Copeland, University of South Carolina
Kurt Pany, Arizona State University
Lawrence Revsine, Northwestern University

COMMITTEE ON INTERNATIONAL FACULTY EXCHANGE

Charge: 1. To prepare appropriate announcements regarding the Distinguished International Visiting Lecturers Program and to provide for dissemination of these materials through the administrative office.

2. To select the professor from the United States to go abroad and to select the area and schools which this professor should visit.

3. To select the professor from abroad to come to the United States and the schools which should be visited.

4. To cooperate and advise the Administrative Secretary in the making of arrangements regarding the program.

Thomas G. Evans, University of South Carolina, Chairman
Haim Falk, McGill University
Charles A. Tritschler, Purdue University
Paul Gerhardt, Administrative Secretary of the Association, *ex officio*

COMMITTEE ON MINORITIES

Charge: 1. To provide liaison with the AICPA in the administration and operation of the minority doctoral fellowship program.

2. To report to the Executive Committee of the Association as to the expenditure of moneys used educating minority professors.

3. To consider further avenues for AAA service to minority group faculty members and minority group colleges and universities and to make recommendations thereon.

Kenneth W. Perry, University of Illinois at Urbana-Champaign, Chairman
Leonard A. Bacon, West State University
Larzette G. Hale, Utah State University
Thomas W. McRae, American Institute of Certified Public Accountants

COMMITTEE TO NOMINATE OUTSTANDING CONTRIBUTIONS TO ACCOUNTING LITERATURE

Charge: 1. For use by the American Institute of CPAs, to nominate works of exceptional merit from books published in English during the period 1974–78 and articles in English published in the calendar year 1978.

2. For use by the Executive Committee of the Association, to select works of exceptional merit from books and articles published in languages other than English.

Kenneth S. Most, Florida International University, Chairman
Henry R. Anderson, California State University, Fullerton
Jacob G. Birnberg, University of Pittsburgh
Athol S. Carrington, University of New South Wales, Australia
Bernard A. Coda, North Texas State University
D. Larry Crumbley, Texas A & M University
Ralph W. Estes, Wichita State University
Irving L. Fantl, Florida International University
S. Paul Garner, University of Alabama
C. T. Heazlewood, University of Wollongong, Australia
Regina E. Herzlinger, Harvard University
Yuji Ijiri, Carnegie-Mellon University
Nicholas J. Gonedes, University of Pennsylvania
Baruch Lev, Tel-Aviv University
P. A. Van Philips, University of Amsterdam
Gary Previts, University of Alabama
Boris Popoff, University of Otago, New Zealand
Hanns Martin Schoenfeld, University of Illinois
Lee J. Seidler, New York University
James E. Sorensen, University of Denver
Cecilia Tierney, Phillips Petroleum Company

COMMITTEE ON PROFESSIONAL EXAMINATIONS

Charge: 1. To elicit questions, problems and model solutions from members for use in licensing and other certificate examinations in accounting.

2. To consult with examination officials of professional and other organizations upon their request.

Park E. Leathers, Bowling Green State University, Chairman
William L. Ferrara, The Pennsylvania State University
Paul A. Griffin, Stanford University
Donald L. Madden, University of Kentucky
Trini U. Melcher, California State University, Fullerton
Russell J. Petersen, Arizona State University
Karl E. Reichardt, Institute of Management Accountants
Jane B. Stockard, Kansas State University
David A. Wilson, Arthur Young & Company, Houston
Charles H. Calhoun III, University of Miami

PUBLICATIONS ASSISTANCE COMMITTEE

Charge: 1. To assist the Sections and Regions of the Association, at their request, to produce quality publications.

2. To assemble cases and materials that are helpful in carrying out this charge.

3. To recommend to the Executive Committee any modifications or extensions of this project.

James Don Edwards, University of Georgia, Chairman
Don DeCoster, University of Washington
Thomas F. Keller, Duke University
Gary John Previts, University of Alabama

ADVISORY COMMITTEE ON RESEARCH INTO INSTRUCTIONAL METHODS IN ACCOUNTING

Charge: To assist the Director of Education to administer the grant from Coopers & Lybrand for research into instructional methods in accounting.

Leon E. Hay, University of Indiana, Chairman
Robert E. Schlosser, Coopers & Lybrand
James R. Boatsman, Oklahoma State University
Richard W. Metcalf, University of Nebraska—Lincoln
Consultants: Douglass G. Boshkoff, Indiana University (School of Law)
C. Edward Cavert, Extended Learning Institute, Annandale, Virginia

RESEARCH ADVISORY COMMITTEE

Charge: To advise the Director of Research in the development and administration of the Association's program in accounting research.

Eugene E. Comiskey, Purdue University, Chairman
G. Richard Chesley, Dalhousie University
Paul A. Griffin, Financial Accounting Standards Board
William L. Felix, Jr., University of Washington
A. Rashad Abdel-khalik, University of Florida

COMMITTEE ON TRUEBLOOD SEMINARS

Charge: To assist Touche, Ross & Co. in planning and conducting The Trueblood Seminars, staffed and funded by Touche, Ross & Co.

Frank R. Rayburn, University of Alabama, Chairman
Rene P. Manes, University of Arizona
Jack C. Robertson, The University of Texas, Austin

FEDERAL TAX COMMITTEE

Charge: To develop and submit responses to legislative proposals where academic input seems desirable and to respond to proposed regulations when appropriate.

Michael L. Moore, University of Texas, Austin, Chairman
D. Dale Bandy, California State University, Fullerton
John J. Barcal, University of Southern California
Albert H. Cohen, Price Waterhouse & Co.
Dennis J. Gaffney, Michigan State University
Sam A. Hicks, University of Alabama
Lawrence C. Phillips, Case Western Reserve University
Craig E. Reese, North Texas State University
Edward J. Schnee, University of Kentucky

MEMBERSHIP COMMITTEE 1978–79

Loren Nikolai, Chairman, University of Missouri at Columbia

ALABAMA	Percy Yeargan	University of Alabama, Birmingham
	Rudolph S. Lindbeck	Auburn University
	J. Frank Sailors	University of Alabama
ALASKA	Harold M. Nix	University of Alaska
ARIZONA	J. Hal Reneau	Arizona State University
	Taylor W. Foster, III	University of Arizona
ARKANSAS	Bob Glover	University of Arkansas, Little Rock
	Lloyd Seaton, Jr.	University of Arkansas
CALIFORNIA	Stewart Berkshire, Jr.	California State University, Long Beach
	Sharon M. Douglas	San Diego State University
	Leslie R. Loschen	University of Southern California
	Francis Budd Tims	California State University, Hayward
COLORADO	John D. Bazley	University of Denver
	Harold L. Geu	Colorado State University
CONNECTICUT	Richard F. Kochanek	University of Connecticut
	Robert Dennis	University of Hartford

Delaware	Arthur G. Hendricks	University of Delaware
Florida	Kenneth S. Lorek	Florida State University
	John H. Salter	Florida Technological University
Georgia	Gary A. Luoma	Georgia State University
	G. G. Neffinger	Atlanta University
Hawaii	John M. Strefeler	University of Hawaii
Idaho	Alistair R. MacMillan	Boise State University
Illinois	R. S. Gupta	Chicago State University
	Ann B. Pushkin	Northern Illinois University
	Alfred V. Robinson, Jr.	University of Illinois at Chicago Circle
Indiana	J. R. Barnhart	Ball State University
Iowa	A. Douglas Hillman	Drake University
	Dan S. Dhaliwal	University of Iowa
Kansas	Kenneth L. Fox	Kansas State University
	Maurice E. Stark	Kansas State University
Kentucky	Archie Faircloth	University of Louisville
	James R. Holmes	University of Kentucky
Louisiana	Alan J. Winters	Louisiana State University
	J. Edwin Priddle	University New Orleans
Maine	Carl W. Alberni	University of Maine, Orono
Maryland	Sharon L. Robinson	Frostburg State College
	A. J. Stagliano	University of Maryland
Massachusetts	Ronald B. Pawliczek	Boston College
	Donald R. Simons	Boston University
Michigan	Stephen L. Buzby	Michigan State University
	Robert W. Redlin	University of Detroit
	Jack D. Schroeder	Wayne State University
Minnesota	Ellsworth C. Granger, Jr.	Mankato State University
	Frederick R. Jacobs	University of Minnesota
Mississippi	Homer H. Burkett	University of Mississippi
	Roger D. Calcote	Jackson State University
Missouri	Loren A. Nikolai	University of Missouri at Columbia
	Kenneth R. Lambert	University of Missouri at Columbia
	John N. Kissinger	Washington University
Montana	Robert Rogowski	University of Montana
Nebraska	John A. Caspari	University of Nebraska, Lincoln
	Joseph V. Techavichit	University of Nebraska, Omaha
Nevada	Kalo E. Neidert	University of Nevada, Reno
New Hampshire	Paul M. Buck	Plymouth State College
New Jersey	Jeremiah G. Ford	Seton Hall University
	Leo McMenimen	Rutgers University

NEW MEXICO	William L. Call	New Mexico State University
	Donald K. Clancy	University of New Mexico
NEW YORK	Seymour Eisenman	Baruch College, CUNY
	Steven Lilien	Baruch College, CUNY
	Joseph C. Rue	St. Bonaventure University
	Linda Kinney	Dutchess Community College
NORTH CAROLINA	Dorothy Brandon	East Carolina University
	Stephen A. Jolly	University of North Carolina, Charlotte
NORTH DAKOTA	M. Burton Oien	University of North Dakota
OHIO	Mark F. Asman	Bowling Green State University
	Richard A. Epaves	Cleveland State University
	Felix P. Kollaritsch	The Ohio State University
	J. Timothy Sale	University of Cincinnati
OKLAHOMA	Gordon L. Neilsen	University of Tulsa
	G. Michael Crooch	Oklahoma State University
OREGON	Larry L. Lookabill	University of Oregon
	Richard H. Visse	Portland State University
PENNSYLVANIA	Dempsey M. Dupreé	Clarion State College
	Frank Luh	Lehigh University
	Prem Prakash	University of Pittsburgh
	Lee H. Radebaugh	Pennsylvania State University
RHODE ISLAND	Richard Vangermeersch	University of Rhode Island
SOUTH CAROLINA	Jimmy D. Sheriff	Clemson University
	Carl G. Kretschmar	University of South Carolina
SOUTH DAKOTA	Samuel K. Kniffen	University of South Dakota
TENNESSEE	George M. Blankenbeckler	Middle Tennessee State University
	Louis E. Mullen	East Tennessee State University
TEXAS	Steven M. Flory	Texas A&M University
	Gary Grudnitski	The University of Texas, Austin
	James P. Mandel	Rice University
UTAH	D. Gerald Searfoss	University of Utah
	Jay M. Smith, Jr.	Brigham Young University
VIRGINIA	Gary Cunningham	Virginia Polytechnic Inst. and State University
	Charles L. Holley	Virginia Commonwealth University
VERMONT	Peter E. Battelle	University of Vermont
WASHINGTON	Lois Etherington	Washington State University
	James H. Pratt	University of Washington
WASHINGTON, D.C.	George H. Bodnar	George Washington University
	Ronald J. Points	General Accounting Office
WEST VIRGINIA	Jay H. Coats	West Virginia University
WISCONSIN	Larry Ozzello	University of Wisconsin—Eau Claire
	Kailas J. Rao	University of Wisconsin—Milwaukee

WYOMING	Michael J. Cerullo	University of Wyoming
AUSTRALIA	Ronald Ma	University of New South Wales
CANADA	C. A. Prentice	University of Calgary
ENGLAND	Peter L. Watson	London School of Economics & Political Science
NEW ZEALAND	Bevan J. Clarke	University of Canterbury
PUERTO RICO	Manuel L. Montalvo	University of Puerto Rico
SCOTLAND	Tom Robertson	University of Edinburgh

ADMINISTRATORS OF ACCOUNTING PROGRAMS GROUP

Board of Governors

President—K. Fred Skousen, Brigham Young University
Vice President—William Markell, University of Delaware
Secretary—Stephen E. Loeb, University of Maryland
Treasurer—Robert W. Williamson, University of Notre Dame
Past President—Doyle Z. Williams, University of Southern California

Committee on Continuing Education

Charge: 1. To plan, coordinate, and administer the AAA Chairperson's Seminar.
2. To serve as liaison for other continuing education activities that the AAP might become involved with.

Coordinating Board Member—Clarence G. Avery, Florida Technological University
Members—Alan Johnson, Chairperson, California State University—Hayward
G. F. Dominiak, Texas Christian University
Bob West, University of South Florida

Committee on Current Affairs

Charge: To monitor developments of current interest to the AAP membership (e.g., recruitment and accreditation), and to inform the membership (generally through the newsletter) as to these developments.

Coordinating Board Member—Robert K. Zimmer, University of Minnesota
Members—E. J. DeMaris, Chairperson, North Texas State University
Herbert E. Miller, University of Georgia
Russell J. Petersen, Arizona State University
Harold M. Sollenberger, Michigan State University
Edward E. Milam, University of Mississippi

Data Base Committee

Charge: 1. To review the data base needs of Accounting Administrators.
2. To develop and implement a system for collecting, distributing, and maintaining a national data base for accounting programs.

Coordinating Board Member—Donald E. Kieso, Northern Illinois University
Members—Charles Carpenter, Chairperson, Miami University
Ed Summers, University of Texas—Austin
Doyle Z. Williams, University of Southern California
John Simmons, University of Florida
Charlie Weiss, Seton Hall University

Membership Committee

Charge: To encourage and solicit membership in the Administrators of Accounting Programs Group of the AAA.

Coordinating Board Member—Clarence G. Avery, Florida Technological University
Members—Larzette G. Hale, Chairperson, Utah State University
Charles T. Andrews, California Polytechnic State
M. Onsi, Syracuse University
Bruce T. Kruse, Western Illinois University
Gale E. Newell, Western Michigan University
Lowell Chapman, Ferris State College
Ronald O. Niemeyer, Jackson State University

Committee on Nominations

Charge: To nominate officers and Board Members as provided in the By-Laws.

Coordinating Board Member—K. Fred Skousen, Brigham Young University
Members—Doyle Z. Williams, University of Southern California
Elton A. Devine, Eastern Michigan University
Mohamed E. Moustafa, California State University—Long Beach
John T. Wheeler, University of California—Berkeley
K. Fred Skousen, Brigham Young University

Committee on Organization and By-Laws

Charge: To review the AAP's organizational structure and By-Laws, and propose changes as deemed appropriate in accordance with the By-Laws.

Coordinating Board Member—Robert K. Zimmer, University of Minnesota
Members—Walter James, Chairperson, Washburn University
Robert B. Sweeney, University of Alabama

Committee on Research and Publications

Charge: 1. To prepare and issue a Fall and Spring Newsletter for the membership.

2. To perform the annual faculty market survey, prepare a written report for the membership by August 15, 1979, and present the results of the survey at the 1979 annual membership meeting.

3. To identify other research areas of concern to the membership; facilitate research efforts in these areas, and recommend publications of interest as appropriate.

Coordinating Board Member—Thomas F. Keller, Duke University
Members—Spencer J. Martin, Chairperson, University of Rhode Island
Belverd Needles, DePaul University
Allan R. Bailey, San Diego State University
Bob Jensen, Florida State University
E. James Meddaugh, Rochester Institute of Technology

AMERICAN TAXATION ASSOCIATION SECTION

Officers

President—Albert R. Mitchell, West Texas State University
President-Elect—Allen Ford, University of Kansas
Vice President—Jane O. Burns, Indiana University
Secretary-Treasurer: Boyd Randall, Brigham Young University

Trustees

A. J. Cheifetz, Lester Witte & Company
Earl F. Davis, University of Georgia
Arthur J. Dixon, Oppenheim, Appel, Dixon & Company
Catherine E. Miles, Georgia State University
Lyle Petit, Peat, Marwick, Mitchell & Company
Donald H. Skadden, University of Michigan
Willis C. Stevenson, University of Wisconsin—Madison
Vic H. Tidwell, Arizona State University

Counsel

Kelleher Riess, Tulane University

1979 Annual Meeting

Program Chairman—Barry C. Broden, University of Miami
Site Arrangements Chairman—James E. Wheeler, University of Michigan. Visiting, University of Hawaii, 1979

The Journal

Charge: Implement the recommendations of the 1977–78 ATA Publications Committee.

Editor—G. Fred Streuling, Brigham Young University
Editorial Board—Ron Bagley, University of Utah
James H. Boyd, Arizona State University
D. Larry Crumbley, Texas A&M University
Anna C. Fowler, University of Texas—Austin
J. W. Giese, North Texas State University
Philip J. Harmelink, University of Cincinnati
J. Warren Higgins, University of Connecticut
Ken Milani, University of Notre Dame
James E. Parker, University of Missouri—Columbia
James L. Pyle, Laventhol & Horwath
Allan H. Savage, New Mexico State University
Richard P. Weber, University of Wisconsin—Madison
James E. Wheeler, University of Michigan
Eugene Willis, University of Illinois

ATA Newsletter

Charge: Continue the preparation and distribution of the *ATA Newsletter* until ATA commences publication of a journal.

Editor—Ken Milani, University of Notre Dame
Advisory Group—Charles Calhoun, University of Miami
Dale Davidson, Arizona State University
Kevin Misiewicz, University of Notre Dame

Accreditation Committee

Charge: Coordinate with and provide input to the Accounting Accreditation Planning Committee of the American Assembly of Collegiate Schools of Business concerning collegiate tax education.

Chairman—Allen Ford, University of Kansas
Members—Durwood L. Alkire, University of Washington
John B. Barrack, University of Georgia
Jerome S. Horvitz, University of Houston
Harold Q. Langenderfer, University of North Carolina
Ray Sommerfeld, University of Texas—Austin

Tax Course Syllabi Committee

Charge: Based upon research conducted during 1977–78, develop and present to the membership syllabi for first and second courses in taxation.

Chairman—Kenneth H. Heller, University of Georgia
Members—Richard F. Bebee, Miami University
Rick Boley, University of Michigan
Jane O. Burns, Indiana University
Arthur E. Carlson, Washington University
John D. Everett, Bowling Green State University
Sally Jones, University of Texas—Austin
James E. Smith, College of William and Mary
Jay Morgan White, Brigham Young University

Tax Case Development Committee

Charge: Collect, write and prepare for publication by ATA cases suitable for use in college and university tax courses, including suggested solutions, discussion points and/or research notes for each case.

Chairman—Jack L. Kramer, University of Texas—Austin
Members—Jane O. Burns, Indiana University
P. Michael Davis, University of Kentucky
Leslie E. Greenberg, Deloitte Haskins & Sells
Philip J. Harmelink, University of Cincinnati
Naomi McCarty, Kansas State University
Ronny Ross, Indiana University
Richard P. Weber, University of Wisconsin—Madison

Monograph Committee

Charge: Review and, as deemed appropriate, recommend for publication by ATA as monographs papers submitted on topics in taxation.

Chairman—D. Larry Crumbley, Texas A&M University
Members—Patricia Elliott, University of New Mexico
Ted D. Englebrecht, University of Oklahoma
Eugene Seago, Virginia Polytechnic Institute
Martin Spencer, St. John's University
Willis C. Stevenson, University of Wisconsin—Madison

History Committee

Charge: Collect and preserve for future reference copies of all pertinent documents and correspondence related to the formation and operations to date of ATA. Investigate and if deemed feasible inaugurate a system of cataloging and indexing of these materials.

Co-Chairmen—Don C. Marshall, University of Missouri—Columbia
Ephraim P. Smith, Cleveland State University
Members—Robert M. Anderson, Attorney at Law
Ted L. Fisher, Louisiana Tech University
Frederick R. Jacobs, University of Minnesota

AUDITING SECTION

Officers

Chairman—Jack C. Robertson, University of Texas—Austin
Vice Chairman (Academic)—Neil Churchill, Harvard University
Vice Chairman (Practice)—James K. Loebbecke, Touche Ross & Co., New York
Secretary—Jay M. Smith, Jr., Brigham Young University
Past Chairman—Alvin A. Arens, Michigan State University
Newsletter Editor—Alvin A. Arens, Michigan State University

Committee Chairpersons

Education—Robert E. Hamilton, University of Minnesota, Research Bibliography Coordinator, 1978–79
Bart H. Ward, Touche Ross & Co., New York, CPE for Academics Coordinator, 1977–79
Gary L. Holstrum, University of Florida, Annual Meeting—1978–79 Education Session Coordinator
Michael J. Barrett, University of Missouri—Kansas City, Governmental-Internal Coordinator, 1978–79
Research—William Felix, University of Washington

Regional Chairpersons

Northeast—Dr. Joseph A. McHugh, Boston College
Mid-Atlantic—Dr. Martin Taylor, University of Maryland
Southeast—Dr. Alan J. Winters, Louisiana State University
Ohio—Dr. Hugh Hoyt, Miami University
Midwest—Dr. Robert E. Hamilton, University of Minnesota
Southwest—Dr. Frederick G. Davis, North Texas State University
West—Dr. John Rhode, University of California—Berkeley
Canada—Prof. Wai P. Lam, University of Windsor

INTERNATIONAL ACCOUNTING SECTION

Officers

Chairman—Lee H. Radebaugh, The Pennsylvania State University
Vice Chairman (Academic)—Dhia D. AlHashim, California State University, Northridge
Vice Chairman (Practice)—Ralph J. Mandarino, Peat, Marwick, Mitchell & Co., Detroit
Secretary—Irving L. Fantl, Florida International University
Treasurer—Norlin G. Rueschhoff, University of Notre Dame
Chairman, Advisory Board—Gerhard G. Mueller, University of Washington

Newsletter

Associate Editor—Peter Holzer, University of Illinois
Assistant Editor—Maureen Berry, University of Illinois

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Seiichi Sato, Yokohama National University, Tokyo, Japan
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Diego Foyo, Valores Industriales, S. A., Mexico
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Andre Zund, Switzerland
Eugene J. Minihan
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A G. Coenenberg, Universitat Augsburg, West Germany
Harvey Mann, Concordia University, Canada
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Linda Kistler, Lowell Technological Institute
Yaw M. Mensah, Indiana University
Norman Bartczak, Harvard Business School
Frank R. Urbancic, Youngstown State University
Ellen Cook, University of San Diego
Gary M. Cunningham, Virginia Polytechnic Institute and State University
Wayne A. Label, Southern Illinois University
Konrad W. Kubin, Virginia Polytechnic Institute and State University
William C. Dent, Elmer Fox, Westheimer & Company, Colorado
Helen Morsicato, University of Oregon

COMMUNITY/JUNIOR COLLEGE SECTION

Officers

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Vice Chairman and Chairman-Elect—Lorraine Hicks, State Technical College at Memphis
Secretary—Lee C. Wilson, Mesa Community College

MANAGEMENT ADVISORY SERVICES SECTION

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Vice Chairman—Edward L. Summers, University of Texas—Austin
Secretary—Thomas E. Gibbs, Potter & Company, Lexington, Kentucky
Past Chairman—Charles Litecky, University of Missouri—Columbia

Regional Vice Chairman

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Midwest—A. Douglas Hillman, Drake University
Northeast—Joseph L. Sardinas, Jr., University of Massachusetts
Southwest—Bruce E. Collier, Texas Tech University
Western—J. Owen Cherrington, Brigham Young University
Ohio—Kenneth Rosenzweig, Ohio State University
Canadian—Hartmut J. Will, University of British Columbia
Southeast—S. Philip Harris, Jr., Peat, Marwick, Mitchell & Co., New York and North Carolina

Committee Chairmen

Education Committee—Gary M. Grudnitski, University of Texas
MAS Standards Committee—James C. Kinard, Ohio State University
Membership Committee—A. Douglas Hillman, Drake University

PUBLIC SECTOR SECTION

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Chairman-Elect—William A. Broadus, Jr., U.S. General Accounting Office
Secretary—William W. Holder, Texas Tech University
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Newsletter Committee

Chairman—Robert Ingram, University of South Carolina
Members—James M. Williams, Municipal Finance Officers Association, Chicago
A. M. Mandolini, Peat, Marwick, Mitchell & Co., Chicago
John Engstrom, University of Georgia
James Patton, University of Pittsburgh

Membership Committee

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Members—W. B. Bolton, Government of Canada
Ray Brown, University of Denver
John Dettman, University of Minnesota—Duluth
Carl G. Orne, California State University—Hayward
Margaret C. Veatch, University of Arkansas—Little Rock
Jackson A. White, Southern Illinois University

Research Committee

Chairman—Abraham J. Simon, Queens College, CUNY
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BOOK REVIEWS

Thomas J. Burns, Editor

EDITOR'S NOTE: Books for review should be sent to Professor Thomas J. Burns, The Ohio State University, 1775 College Road, Columbus, Ohio 43210.

A. RASHAD ABDEL-KHALIK and THOMAS F. KELLER, Editors, *Financial Information Requirements for Security Analysis*, (Graduate School of Business Administration, Duke University, Proceedings from the Second Accounting Symposium, December 2-3, 1976 pp.iii, 164, $5.25).

A reviewer must adopt a somewhat different role for a collection of conference papers and discussions than for a manuscript that does not incorporate its own critical examination. After summarizing the major papers, some uses for the collection are suggested.

The papers all focus on the accounting/security analysis interface. The editors might have included a statement of purpose and objectives for the symposium. Harold Bierman's closing synthesis does capture the thrust of all the papers, except for Robert May's. However, except for his comparison of his expectations about the symposium content (discussions of the importance of accounting, market efficiency, disclosure and form, cost of information, desirability of regulation and ways to improve accounting) to the content of the papers, the reader can only surmise the intent of the conference organizers.

In the first paper, "Toward a Theory of Investment Value," Jack L. Treynor suggests that security valuation cannot be based on currently produced accounting data. Rather, he argues that a valuation theory for the firm's capital assets must be developed. Only when the theory is developed can the corporate accounting disclosure necessary for proper valuation be determined. Treynor develops, primarily in a narrative, the basic foundations of his proposal for a valuation theory.

In "Information Needs for Portfolio Choice: Some Normative Aspects," Nils H. Hakansson indicates that investor information needs cannot be determined until models of 1) decision-making, 2) consumer-investor choice behavior, 3) the behavior of the firm, and then 4) financial market equilibrium are prepared. Progress in accounting disclosure policies can only be made when these models are in place. Hakansson continues by using informal analytics to develop criteria for deciding who should and should not hold the market portfolio under conditions of unequal information.

The next paper, "The Implications of Security Price Research for Disclosure Policy and the Analyst Community," authored by William H. Beaver, is a verbal description of the current disclosure environment followed by descriptive notes on the role of anecdotal evidence and the implications and non-implications of the empirical security price research literature for disclosure policy.

The fourth paper, "Some *a priori* Properties of Conventional and Current Cost Income Numbers *vis-a-vis* Security Analysts," partially returns to a concept that has been absent from the literature for some time, what will the numbers look like if some accounting/disclosure alternative is adopted. The author, Robert G. May, identifies some variables that financial analysts have found useful. Then, through a simple but complete example, he produces financial statements and then the financial analysis variable outcomes for conventional accounting procedures and for one of the many current cost accounting procedures.

The final paper, "On the Adequacy of Publicly Available Financial Information for Security Analysis," by Baruch Lev, begins by examining how to define adequacy in the content of accounting disclosure. He continues by examining research findings on the use of financial accounting data and concludes that the current disclosure is satisfactory. The concluding section argues that the adequacy of current disclosure is consistent with a competitive information generating process.

These papers directed to a broad audience of academics and practitioners are written without extensive use of symbols, mathematics, or formal analytical development. Many of the discussants were practitioners. The book could be used effectively in an undergraduate theory course or in an MBA theory or empirical research course. If an instructor wanted to devote two or three sessions to consideration of disclosure, these papers would offer a useful, contemporary extension of material typically found in a theory text.

The discussions by the practitioners are especially useful since they clearly indicate that recent academic research in accounting, economics, and finance has not been ignored by the business community.

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JOHN W. ANDERSON and ROBERT W. LENTILHON, *The CPA Examination: Volume 1—Practice, Auditing and Theory* and *The CPA Examination: Volume 2—Suggested Solutions*, Second Edition (Cincinnati: South-Western Publishing Co., 1978, pp. xx, 500 and 399, $17.75 each).

Designed for use in a formal CPA review course and as an individual self-study guide, the second edition is a substantial revision of the first, particularly with respect to chapter coverage, arrangement of topics, and the manner in which theory is interweaved with practice. Such topics as quantitative methods and management accounting have received the needed expanded treatment. Fund accounting is particularly well done, with emphasis on college and hospital accounting in addition to municipal accounting.

Included is a detailed analysis of all CPA exams from 1967 through 1976 by topic coverage. The chapters devote greater coverage to those topics appearing most often on the exams (with the exception of auditing and taxation which are discussed below). This makes the books particularly valuable for those candidates who have a limited amount of study time available.

Each chapter contains a condensed review of the topics covered and an illustrative CPA problem which is analyzed and solved. There are also hints as to how to solve each of the problems provided at the end of the chapters. Volume II provides solutions to all problems. The solutions to multiple-choice questions are annotated and make reference to authoritative pronouncements.

One of the biggest criticisms that can be made about the books is that neither contains an index. There is no way to refer to a specific subject or pronouncement in the books.

Although the preface to Volume 1 states that revisions have been made in some solutions where there have been modifications in accounting treatment, this was not always true. The taxation chapter was particularly bad. In one place, a 1973 tax problem and solution were illustrated. The solution was the original AICPA solution. A footnote states that "some changes in treatment have taken place since 1973 affecting these items." This would not be of much help to the candidate. Even this warning did not accompany the multiple-choice questions. Although the current corporate tax rates were given in the text, they were not used to solve the multiple-choice questions. This is frustrating to students who are not even aware that the old rates ever existed. There were also out-of-date solutions for capital gains and investment credit problems. The entire coverage of taxation is rather limited, as there are only two pages of textual material devoted to individual taxation. Partnership and corporate taxation are explained in one page.

Even though the title to Volume 1 includes the word "auditing," there is little reference to the subject in the books. Auditing is summarized in five pages of textual material. This is followed by 17 pages of old questions. Considering that some competing books devote over a hundred pages to auditing, it is hard to imagine that these few pages could be worthwhile. Probably "auditing" should have been eliminated from the title of the book.

Although these books have some faults, they could be useful in a CPA problems course where the emphasis was primarily on accounting practice. The books would also be beneficial to the candidate studying for the theory section, but the volumes would have to be supplemented by recent Statements on Financial Accounting Standards. Although this reviewer has been critical of the abbreviated coverage of some topics, the length of the books may be viewed as an asset by some. The books are shorter than many competing works. A person with limited time may find the books quite valuable, particularly when studying for the practice section of the examination.

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ROBERT N. ANTHONY, *Accounting for the Cost of Interest* (Lexington, Massachusetts: D. C. Heath and Company, 1975, pp. xi, 133, $11.50).

Under current accounting practice, interest on debt capital is recognized as an expense of the period, but interest on equity capital is not recorded for financial accounting purposes except in the case of public utilities where interest on debt and equity capital used for construction purposes is recorded as an element of the cost of constructed assets. In this book, Anthony proposes formal recognition of the cost of using both debt and equity capital. He also proposes that interest on the capital used in the manufacturing process should become part of the cost of manufactured products, while interest on capital used in marketing, administrative, and non-manufacturing activities should be charged as an expense of the period. As the Financial Accounting Standards Board is formulating a "Conceptual Framework for Financial Accounting and Reporting" this is a timely book. Although the proposal, if adopted, would present a significant departure from prevailing financial accounting practice and would require a reorientation in the concept of accounting income, the proposal is both feasible and beneficial for financial accounting.

In Chapter 2, the theoretical soundness of the proposal is discussed from the viewpoint of economic theory, financial and management accounting concepts. Economists generally do not differentiate between debt and equity capital in their definition of the "factors of production." Accordingly, it would be consistent with economic theory to recognize the cost of using both debt and equity capital in financial accounting. The entity concept of accounting considers both creditors and equity investors as outsiders. Thus, it seems just as appropriate to measure the cost of using equity capital, which is supplied by outside shareholders, as to measure the cost of using debt capital, which is furnished by outside creditors. In addition, the cost of using capital is not fundamentally different from the cost of using other resources such as labor, materials, and services. Therefore, interest on both debt and equity capital used in the manufacturing process should be "attached" to an asset until the asset becomes an expense. Anthony also defends his proposal from the standpoint of objectivity and the realization concept, while acknowledging that the proposal would result in a different definition of accounting income. For management accounting, it is increasingly common to recognize the cost of using both debt and equity capital in management decisions for capital acquisitions, pricing, and divisional performance measurement; therefore, explicit recognition of interest cost on both debt and equity capital is consistent with providing relevant information to management.

The implications of the proposal for financial reporting, public policy, and management accounting are discussed in Chapters 3, 4, and 5, respectively. The proposal would result in higher reported amounts for certain assets, with a corresponding increase credited directly to shareholders' equity for the implicit interest cost on equity capital. Inventories that are held for significantly long periods of time and inventories of manufactured goods would be reported at higher amounts because of the inclusion of interest costs associated with holding such inventories and interest on the capital employed in the manufacturing process. Amounts reported for physical plant would be increased by the inclusion of interest cost as an element of the cost of acquisition or construction. At the same time, reported income would be lower because of the deduction of equity interest from income. Since net income reported under the proposed method would reflect earnings in excess of the minimum cost of equity capital, the reported income would be a better measure of performance and would not be affected by the company's capital structure. Anthony explains that accounting information generated under the proposal would facilitate rate setting, price control, and contract pricing because of the availability of additional relevant information on the cost of equity capital. The proposal would also harmonize management accounting and financial accounting by reducing the need for two sets of books, one for management accounting and one for financial accounting, and would render more credibility to internal accounting information provided for management decisions.

Chapters 6 and 7 discuss the problems of measuring the interest costs of equity capital and describe the procedures for incorporating them in the accounts. Although further research is required, Anthony suggests that, as a starting point, a feasible and objective way of determining the cost of equity capital may be to utilize a rate specified by the Financial Accounting Standards Board or a rate arrived at by a method prescribed by the FASB. The accounting procedures for the proposal, including comparative statements of current and proposed approach, are presented.

Since the change proposed is substantial, has many ramifications and requires an extensive educational process before its import will be well understood, Anthony favors a gradual transition to the new method. He suggests starting with selected items in those industries which typically hold inventories over a long period of time, such as the standing timber of lumber companies, the oil reserves of petroleum companies, and the inventories of tobacco, distilled liquor, and other products that are aged for several years. Concurrently, he advocates the inclusion of interest in the cost of self-constructed buildings and equipment.

Although Anthony states that his proposal is not a new one, his work is definitely a significant contribution to the accounting literature. Both the theoretical and the practical aspects of the proposal are thoroughly discussed and are developed in a very logical fashion. The book should be required reading for students of accounting theory and would be most enlightening for accounting practitioners and businessmen who are interested in the advancement of the state of the art of accounting.

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WILLIAM T. BAXTER, *Accounting Values and Inflation* (London: McGraw-Hill Book Company, 1975, pp. 217, $10.75).

This idiosyncratic book was sponsored by the Research Committee of the Institute of Chartered Accountants in England and Wales. A copy of the Institute's Provisional Statement of Standard Accounting Practice No. 7 (SSAP 7), "Accounting for changes in the purchasing power of money," is reproduced as an appendix. SSAP 7 is the equivalent, so far as U.K. accountants are concerned, of the FASB's proposed statement entitled *Financial Reporting in Units of General Purchasing Power* (December 31, 1974). In spite of differences of length, scope and presentation, these two documents proposed essentially the same method of adjusting historical cost financial statements for general price-level changes.

The book starts with three chapters on distinguishing general and special price change, on measuring price change, and stating that historical cost accounting produces incorrect figures. Chapter four compares alternative concepts of wealth and income and again criticizes accounts which ignore price change. Chapter five contrasts revaluation with stabilization. The next five chapters discuss and illustrate methods of adjusting for price change in relation to money assets and liabilities, profit, inventories, and fixed assets. Chapter eleven restates the author's thesis, first presented in *Economica* in 1955, that accountants contribute to the trade cycle. Chapter twelve is a lengthy summary of Bonbright's deprival theory of value, and considers the need to revalue liabilities (yes) and stockholders' equity (no). Chapter thirteen summarizes the author's 1971 work on depreciation. Chapter fourteen contains a brief discussion of revaluation procedures, and the book concludes with a chapter which contains a worked example.

From the sponsorship of the book and the tone in which it is written, apparently the author is addressing himself to practitioners, in an effort to overcome their resistance to accounting for price-level changes. If so, this book is far too difficult. It is discursive, and fails to present the issues clearly and systematically. Although simplified examples are used, their presentation is complex. (There are some figure errors; see pp. 101, 189). The concepts of being a monetary debtor or creditor, and the significance of the word "net" in relation to these concepts, are not explained. The problem of whether to restate in constant or in current dollars is not resolved, and examples are presented using both, without an explanation of the resulting discrepancies (see, for example, pp. 21-22). The choice of a general or a special index is debated at length, and although chapter eight appears to reject the "special-index man" in favor of the "general-index man," this viewpoint is contradicted by Chapter twelve, and indeed, the concluding example utilizes both revaluation and stabilization.

A major difficulty is the absence of a clear explanation of the way in which factors derived from indices are used to adjust figures for price-level changes. The author's practices are inconsistent; in one example he multiplies by 100/120, in another, by 110/100—1, and in yet a third, by 10/100. As the use of these factors presents neophytes with considerable difficulty, this must be recognized as a serious weakness.

There is, however, an example of the impact of inflation on partnership accounts (p. 59), which would be very revealing to many practitioners.

From the viewpoint of the accounting student, these difficulties are compounded by the absence of references to recent empirical work in this field. The author was unlucky in that some of the best publications on these studies have appeared after this book was written in 1974, but to restrict oneself to the steel industry investigations of Jones in the U.S.A. and Baxter in the U.K. is to ignore much useful material. The bibliographical references are heavily weighted by works on economics, and only two of 50 books, and eight out of 50 articles, were published after 1969.

Perhaps the principal interest of this book is as a source of ideas for other accounting scholars, as it is throughout highly suggestive of research which needs to be performed, and the author debates, in a highly personal manner, many accounting issues under examination at the present time.

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LEOPOLD A. BERNSTEIN, *Financial Statement Analysis: Theory, Application, and Interpretation*, Revised Edition (Homewood, Illinois: Richard D. Irwin, Inc., 1978, pp. ix, 784, $18.50).

Financial accounting possesses a certain seductive, elegant precision that lures us accounting professors into treating it as if it were worthwhile in its own right. But, of course, we should know better. Financial accounting is worthy of our attentions only insofar as it provides useful knowledge about the world around us. In that regard, works on financial statement analysis are important because they remind us that accounting statements must not be prepared for certification only, but they must also be read for understanding and analyzed for information.

Bernstein's work is a major contribution to this branch of accounting literature. It is a comprehensive, detailed presentation of how to understand and analyze financial statements. This revised edition follows the same three-part format as the original edition. The first section on the "accounting framework" introduces general aspects of accounting and sets out the objectives of statement analysis. The second section on the "raw materials of analysis" takes a long, deep look at the vexing issues underlying each item in accounting statements. The third section on the "main areas of emphasis" suggests various tools for analyzing accounting statements especially financial ratios. All of these materials are summed up in a long case study serving as the final chapter.

Superficially, this revised edition seems to be the same as the original. There are still 23 chapters, all with the same titles as before. But a close inspection reveals a host of changes, many of them subtle. For example, to keep up with the changing times, an illustration involving a student selling slide rules has been changed to selling pocket calculators. Some of the more important revisions will be considered further here.

The initial section on the framework of statement analysis has been revised in one important regard. The implications of the efficient market hypothesis and portfolio theory are discussed in the third chapter on the objectives of statement analysis. A real dilemma exists here for all of us. If our capital markets are efficient and if unsystematic risk is not rewarded, then how do we convince anyone that they should perform the arduous tasks, such as statement analysis, necessary to sustain efficient markets? In my opinion, Bernstein does not resolve this dilemma. He suggests that individual, private gains are earned in advance of the aggregate market returns usually studied, an argument which I doubt will sway many efficient market adherents. But I don't wish to carp. Bernstein is to be commended for raising this issue at the outset of his book, rather than burying it in the rear, as too many authors do.

The second section on the raw materials of analysis has been revised throughout. In particular, materials on foreign currency transactions and price-level-adjusted statements have been substantially revised, in keeping with current developments in those areas. This second section is really a guided tour through the various components of financial statements *and* through the various developments in accounting principles. The FASB and SEC have been busily issuing new statements and releases, and Bernstein has artfully weaved these changes into his text. Those, like myself, who are only vaguely aware of the busy activities of the FASB will find this section quite informative. Descriptions of accounting principles tend to become labyrinthian, but Bernstein, at various intervals in this section, helps clear up the confusion by discussing "implications for analysis." However, I have a nagging suspicion that this section may be starting to sag under the collective weight of these sundry pronouncements on accounting standards. Since I had the advantage of comparing this revision with the original edition, I could appreciate the masterful revision Bernstein has accomplished, but a new reader might find the flow of thought a bit erratic in parts because of the splicing and rearranging of materials. In general, reading this section is not an easy-going task, but it is worth the struggle for any reader who desires a full understanding of accounting statements. And, after all, there seems to be little point in analyzing something you do not understand.

The third section on the main areas of emphasis, which Bernstein also calls the "building blocks" of statement analysis, is really the heart of the book because it deals with analysis as such. Good analytical techniques are timeless, and so this section, appropriately, has not changed much. Bernstein divides statement analysis into six areas: short-term liquidity, funds flows, capital structure, return on investment, asset utilization, and operating performance. Within each of these areas, he describes an interesting assortment of ratio relationships, growth-trend measures, and common-size-statement percentages. Interestingly, Bernstein has suggested a few new funds statements ratios. For example, he specifies a ratio of net funds from operations to spending on fixed assets, inventories, and dividends as a measure of "funds flow adequacy." The slow development of funds flow ratios is a curious phenomenon, but their appearance in a work of this type indicates they may have finally arrived. Aside from these funds ratios, most of the materials in this section consist of the tried and true techniques developed over the last six decades.

In regard to pedagogy, an interesting set of short challenging problems, many of them from CPA and CFA exams, are presented at the end of the book. Bernstein has also published another set of problems in the instructor's manual, so ample additional problems are available for exams and special assignments.

In conclusion, Bernstein's book is still the best work on financial statement analysis in the traditional mode. If you have an interest in the subject, you should take a look at this revised edition.

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Harold Bierman, Jr. and Allan R. Drebin, *Financial Accounting: An Introduction*; and Allan R. Drebin and Harold Bierman, Jr., *Managerial Accounting: An Introduction*, Third Editions (Philadelphia: W. B. Saunders Company, 1978, pp. xiii, 452 and xii, 376, $13.95 and $14.95).

In the financial/managerial mode, the two books should serve both accounting majors and non-majors equally well. The financial text introduces debits and credits early and presents examples of journal entries as each topic is discussed. In later chapters, possibly there is too little discussion since journal entries are only displayed to illustrate recording of transactions. But if students think through the rationale for the entries, it could be a strength. The financial text follows the almost standard sequencing of topics found in most introductory books.

The most serious of several defects in Bierman/Drebin deals with long-lived assets. In an illustration (pp. 240 and 241) of a revision in the useful life of a building, the solution of the example charges current income with the cumulative effect of the change in the estimated life as of the end of the period and calculates subsequent depreciation by spreading the revised book value over the remaining life. It is pointed out that some accountants prefer not to make the adjustment but instead to spread the book value at the time the life is revised over the remaining portion of the revised useful life. But under APB Opinion 20, no choice is available since a change in estimate must be treated on a prospective basis with no adjustment to current income for the cumulative effect of the change. Adjustments to income are permissible (indeed, required) only for changes in accounting principles, which is not the case with the authors' example.

In the discussion of investments (pp. 326ff), the reader is not given a clear indication of when, if ever, the various methods must be used. The authors do state that cost must be used when the shares owned do not create substantial influence over the investee, but they do not indicate that the choice is cost instead of equity as an alternative and not cost instead of market as an alternative. In an even more misleading discussion, the authors state that "if market prices are used to record the value of the investment, then changes in market prices must be recognized as affecting the stockholders' equity. One possibility is to treat the change as income (or loss)." Not mentioned is the fact that market value, without restrictions, is not a generally accepted accounting principle.

Managerial accounting course texts are fairly standard, and Drebin/Bierman is not an exception. Yet there is not common agreement as to the sequencing of these topics. The Drebin/Bierman text presents cost accumulation and recording chapters first, followed by cost control chapters, similar to some but not all other texts. Apparently, sequencing is more related to author and instructor preference.

One cannot find fault with what the authors have said concisely. The Drebin/Bierman managerial text has 18 chapters and 364 pages, excluding the appendix and index, for an average of 20.3 pages per chapter which includes questions, problems, and discussion cases. Three managerial accounting texts used for comparison had from 17 to 20 chapters and from 527 to 683 pages for an average of 32.2 pages per chapter. Since topical coverage is similar, the difference must lie in either the level of discussions or the styles of the authors.

The authors have been able to keep the size of the text to a minimum, beyond keeping the level of discussion truly introductory, by demonstrating their points by examples. The text is replete with extended examples and comprehensive illustrations. While conciseness can be a desirable goal, perhaps the authors have gone too far when they took slightly more than seven pages to cover both process and job order costing. But their emphasis is on the nature of these costing methods with no mention of the journal entries involved. Since accounting majors will take a cost accounting course, the authors have provided a reasonable balance that should be equally appropriate for majors and non-majors. The chapter questions and problems contain sufficient material to reinforce adequately the concepts of the chapters and cover a reasonable range of difficulty which gives the instructor a choice of degrees of challenge for his students.

Aside from the technical problems mentioned which can be easily overcome by the instructor, the financial text does an adequate job of balancing the needs of accounting majors and non-majors. The managerial text presents a standard fare of topical coverage and at the same time appears to have returned to the concept of a truly introductory text, which means the book is probably more accurately titled than most competing texts. There is a separate study guide for each book. In both books, there is sufficient problem material to reinforce the chapter contents and to challenge the most demanding students.

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FREDERICK D. S. CHOI and GERHARD MUELLER, *An Introduction to Multi-* New Jersey: Prentice-Hall, Inc., 1978, pp. xi, 365, $18.85).

For many college professors who have been teaching courses in multinational accounting, international accounting, and multinational financial control, for several years without a textbook, this book is the answer to their prayers. They have been exchanging course syllabi and ideas as to where to locate periodical articles, excerpts from books, and whatever bits of information to piece together for their courses. Choi and Mueller have put together a text which utilizes the materials now being used, as well as their own new and refreshing material.

As the first textbook-type publication of its kind, it is relatively short and quite concise, but it includes sufficient material for a three-semester-hour undergraduate course for accounting majors, and sufficient basic material for graduate courses of three semester hours. If the graduate students have undergraduate degrees in accounting, supplementary material related to this text's material might be assigned. If the graduate students do not have undergraduate degrees in accounting, some outside work in basic accounting, such as financial statement analysis and managerial accounting techniques, might be assigned.

The non-accounting graduate student may feel that this book gives too much emphasis to standards of financial accounting as opposed to practices in management accounting. But many foreign subsidiaries do not provide management accounting reports, producing instead financial accounting reports which are used also for managerial accounting purposes.

After a brief overview of the multinational dimensions of accounting, the authors discuss various accounting patterns which exist throughout the world, and some of the variables influential in the development of those patterns, an excellent and simple but conceptual presentation of foreign currency translation, financial reporting to "outsiders," management accounting practices and tools, with emphasis on financial control through planning and reporting, and money management, tax planning, and transfer pricing. In a discussion of current public interest considerations with respect to multinational enterprises, the authors stress the necessity for the corporation to transform itself or be transformed by agents of the public into a unit that continuously considers the concerns of the individual and the country of domicile.

One possible criticism is that the text leaves in the classroom, the professor is expected to be capable of answering *all* questions, he may be placed in an embarrassing position if he does not have ready answers to the authors' questions.

The text is a valuable contribution to the education of accountants as well as non-accountants in international business activities, particularly in the area of the use of accounting information for decision making in multinational operations. This book can help a United States accountant to broaden and strengthen his knowledge of U. S. GAAP and auditing standards. An accountant is not fully educated if he has not studied international accounting, since current United States accounting, a product of accounting and business developments throughout the world, is in a constant stage of change as a result of those developments.

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WILLIAM H. DAUGHTREY and MALVERN J. GROSS, JR., *Museum Accounting Handbook* (Washington, D.C.: American Association of Museums, 1978, pp. ix, 158, $7.50 to members, $8.00 to non-members).

Although this book is a significant contribution to accountants who serve on the boards of museums or who are auditors for museums, it is not of much assistance to the intended readers of the book—the bookkeeper of a small to medium-sized museum. The authors make two misjudgments by assuming that the bookkeeper shall and can decide the extent of the accounting system and that this book can teach bookkeeping, accounting, funds, and budgeting to bookkeepers. The authors state, "The bookkeeper of each museum should select the one method (cash, modified cash, or accrual) of maintaining the books and the one approach to fund accounting best suited to meet the needs of his or her museums." But this decision should be made by an accountant. To illustrate the second misjudgment, consider two passages: "Double-entry bookkeeping is just what it says. Each time a financial event or transaction takes place, it is recorded in the books or records with two entries" and "Fund Balance—A measure of the value of the assets that the museum owns free and clear, that is, the amount that would remain if all the creditors were paid the amounts due them."

The book can serve in reinforcing the goal of improved accounting for museums and as a review of bookkeeping and accounting for bookkeepers and managers of small to medium-sized museums. The authors present an insightful ten-question series over whether to use a cash, a modified cash, or an accrual basis. The questions and analysis are an excellent base for decision making and decision explaining by the accountant. A three-question series is also presented over what funds to employ. The reviews of internal control procedures are very good as is the discussion of the three bases of accounting. The exhibits of accounting statements, charts of accounts, journals, internal management reports, worksheets, and fixed asset registers are very helpful and are useful guides for the trained bookkeeper, working with an accountant.

After six introductory bookkeeping chapters, a concise review of fund accounting is given in the next three chapters followed by chapters on budgeting, cost allocations and accounting by function, contributed services, and depreciation. The final two chapters discuss the capitalization of museum collections and the statement of changes in financial position.

In the first page of the book, the authors recommend highly that the prospective museum bookkeeper read the Museum Accounting Guidelines before continuing. Whether a bookkeeper can read with a high degree of comprehension the Museum Accounting Guidelines, included in the book Appendix, is doubtful. However, the Museum Accounting Guidelines is an extremely useful publication for accountants in their struggle to attain better accounting and reporting for non-profit organizations.

The authors should have recommended a capitalization of museums' collections and exhibits for all museums, rather than to report that "few museums find it practical and useful to reflect values for their collections in their financial statements." While the Museum Accounting Guidelines report that these items are not normally capitalized, this publication added that "Most museums do not capitalize and depreciate their collections and exhibits, and in these circumstances the financial statements do not reflect those assets for which the museum's governing board has stewardship." The authors should have stressed the importance of capitalization and gone beyond the Museum Accounting Guidelines and recommended a utilization report of the collections and exhibitions.

If this book is given to the bookkeeper and the managers of small to medium-sized museums for guidance and decisionmaking purposes, it will be an unused archive. If this book is used by accountants involved with the museum, it will be a treasure.

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SIDNEY DAVIDSON, JAMES S. SCHINDLER, CLYDE P. STICKNEY and ROMAN WEIL, *Managerial Accounting: An Introduction to Concepts, Methods and Uses* (Hinsdale, Illinois: The Dryden Press, 1978, pp. vii, 544).

Starting with a brief overview of the management process and accounting information, the authors argue that accounting information is used for three broad purposes: (1) managerial decision making; (2) managerial planning and control, and internal performance evaluation; and (3) financial reporting and external performance evaluation. The book is organized into five major parts: External Reporting of Managerial Decisions (Chapters 2-3), Managerial Decision Making (Chapters 4-7), Planning and Control (Chapters 8-11), Cost Accumulation and Allocation (Chapters 12-14), and Special Topics in Managerial Decision Making (Chapters 15-18).

The first part provides a good brief summary of the non-procedural aspects of financial accounting. The authors offer this summary in line with their belief that managerial and financial accounting are not mutually exclusive and thus a cohesive link between the two must be made. This reviewer agrees with this line of reasoning and finds their review of financial statements succinctly and well written.

In the second part, the authors get what many would consider the "guts" of managerial accounting by skillfully describing such concepts as incremental analysis, opportunity costs, variable and fixed costs, and the value of information. From there the authors proceed to discuss the idea of cost estimation along with describing some of the various methods for determining such estimates. The remaining two chapters in this section demonstrate the application of the earlier discussed concepts to such short-run operating decisions as cost-volume-profit analysis and such long-run capacity decisions as capital budgeting.

Section three begins with an overview of the planning and control process, which includes a good discussion on the criteria for evaluating planning and control systems. The next chapter deals with period budgeting, or, as many prefer to call it, the master budget. Interpreting variances for sales, production costs, selling expenses, and administrative expenses is also discussed as are some of the issues surrounding the measurement and control of divisional performance.

Section four covers the topics usually associated with *cost accounting*, such as product costing under a job order and process costing system; cost allocation procedures for common costs, joint and by-product issues, fixed costs, and interim reporting; and accounting for inventories —including a discussion of absorption versus direct costing. This entire section covers the material in an analytical manner without getting overburdened with details and keeps the focus on managerial accounting. The final section covers the selected special topics of the effects of changing prices, a closer look at capital budgeting, and the impact of income taxes on business decisions.

The overall impression of the book is quite favorable. This is a cohesive, analytical, and well-written text which emphasizes the use of accounting information rather than its preparation. The authors have adeptly interwoven economic and statistical analysis into the text. Furthermore, most of the examples used in the text are easy to follow and accomplish their intended objective. It does, however, shy away from the behavioral science and organizational theory literature. Given the introductory nature of this text, it is difficult to argue with this boundary choice. Yet, future editions (optimism intended) should include more of this latter type of material.

In conclusion, as a worthy addition and clearly one of the better books among the plethora of recently published managerial accounting texts, it certainly warrants serious consideration.

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SIDNEY DAVIDSON and ROMAN L. WEIL, Editors, *Handbook of Cost Accounting* (New York: McGraw-Hill Book Company, 1978, pp. ix, 758, $23.50).

This well-written cost accounting handbook provides discussion of the information needs of managers and investors, along with explanations of the procedures used to accumulate the information. The writing blends theoretical discussion with the practical needs of managers. Examples are given to illustrate some of the concepts, but are not so numerous as to obscure the main discussion.

The handbook contains 27 chapters, an appendix containing compound interest, annuity, and bond tables, and a thorough index. Each chapter contains a bibliography for those seeking further elaboration or development of a topic. Thirty-two knowledgeable contributors (the majority of whom are in public accounting or education) wrote the chapters, most of which have not appeared in print before.

The editors have chosen to start with a 28-page chapter on the historical development of cost accounting by Professor David Solomons, largely adapted and abridged from an earlier work. This chapter provides a concise and interesting explanation of the development of cost accounting, beginning with the accounting records of Christopher Plantin, an Antwerp printer, in the early part of the 14th century in Italy, and a brief discussion of a shoemaker's accounts in England in 1750. He also traces the history of industrial accounting in the 19th century in England and France, farm accounting in the 18th and 19th centuries, and a more detailed development of costing in the late 19th and early 20th centuries. He concludes the historical development in the mid-20th century before the extensive use of computer-accumulated information (discussed in Chapter 24) and developments such as the Cost Accounting Standards Board.

Chapter 4 is a comparison of economic concepts and cost accounting applications by Professor Gordon Shillinglaw. A number of economic ideas are defined and explained, including variable and fixed costs, short-run marginal cost, incremental cost, opportunity cost, long-run average cost, and present value. Each of these ideas is then viewed from the standpoint of usefulness (or lack of same) in cost accounting.

Cost measurement (Chapter 5) is an elaboration of the nature and classification of costs (Chapter 2) and the application of some of the mathematical concepts in cost accounting (Chapter 3). Subsequent chapters cover operating and cash budgets, costing for material, labor, and overhead, direct (variable) costing, and inventory models.

Job Order Costing is the subject matter of Chapter 13, and includes more emphasis on forms and journal entries than most of the other chapters. Chapter 14 on Process Costing (by Robert L. Kelly and Leonard Pace of Deloitte Haskins & Sells), Chapter 17 on Spoilage, Waste, and Scrap (by Professor Ronald J. Huefner), and Chapter 18 on Joint Products and By-Products (by Professor Hugo Nurnberg) provide excellent coverage of difficult subject matter and of the merits and demerits of the various alternatives available.

Chapters 15 and 16 cover the setting and operation of standard costs. Some of the psychological impacts of standards are discussed, including the basis on which performance is measured and on which rewards are assigned, the difficulty of the standard, participation, and feedback.

William L. Raby of Touche Ross & Co. and Matt G. Minor of Film Finance Group, Ltd., contributed 36 comprehensive, yet concise, pages of tax considerations in cost accounting, covering such topics as the tax accounting problems of inventory, intracompany and intercompany transfers, capital expenditures, research and development costs, vacation pay, employee benefit plans, warranty costs, *etc*. Felix Kaufman of Coopers & Lybrand wrote an interesting chapter on management information systems. Other chapters are on cost-volume-profit analysis, capital budgeting, distribution costs, divisional cost analysis, cost accounting in non-profit (non-government) organizations, and human resource accounting.

The final chapter, written by Donald R. Brinkman of Valuation Systems Corporation, is an excellent commentary on the measurement and uses of replacement costs. This 40-page chapter includes technique uses as well as factors affecting the selection of techniques. Should additional firms be required, or desire, to disclose replacement cost information, the material presented here will prove beneficial.

The editors of a handbook face a very difficult problem in deciding what to include and what to exclude. The reviewer finds little fault with the topics included, but would have liked to have sections included on the purposes and organization of the Cost Accounting Standards Board and the costing of governmental contracts by profit-oriented firms, cost accounting techniques useful for governmental bodies, and beneficial aspects of costing for service businesses. While the index is quite good, some additional cross-referencing within the chapters would be useful (*e.g.*, on p. 2-9, when mentioning the functional relationships between costs and output, it should be noted that this topic is much more thoroughly developed in Chapter 5; when briefly describing spoiled work on p. 9-23, a note that Chapter 17 is devoted to this subject would be helpful).

This handbook is a welcome addition to the literature of cost accounting, particularly since it is intentionally aimed for the use of managers and investors. It provides informative background material on most of the typical and emerging problems of cost accounting, as well as thorough treatment of the underlying concepts that often seem confusing. Managers, investors, and accountants will benefit from the material and reference sources in this volume.

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G. W. Dean and M. C. Wells, Editors, *Current Cost Accounting: Identifying the Issues* (Lancaster, England: International Centre for Research in Accounting, University of Lancaster, 1977, pp. 196).

The editors of this book express concern over the "crusade for current cost accounting (CCA)" in recent years believing there has been little room for counter argument. They hope that their book will help to coordinate the effort to stem the tide in favor of CCA. The book consists of articles, letters, and editorials, mainly from the British and Australian journals. They are written, for the most part, in response to the specific proposals on CCA in the U.K. (the Sandilands Report and Exposure Draft 18 of the Inflation Accounting Steering Group), in Australia (the Provisional Standard on CCA by the National Council of the Institute of Chartered Accountants and the General Council of the Australian Society of Accountants), and in New Zealand (the Richardson Report).

For the American reader who is not familiar with accounting developments in the above-mentioned countries, this book affords the opportunity to become acquainted with the dispute over CCA. In view of the SEC requirement for the disclosure of replacement cost information and the trend towards CCA, the arguments presented by the various writers are worth noting. The editors have accomplished a commendable task in putting together many of the numerous, but scattered, criticisms and expressions of doubt regarding CCA.

However, the editors should have revealed their own position and provided a comment at the end of each section of the book. A confusing aspect of the book is the amalgam of "strange bedfellows." Some of the writers are defenders of historical cost (*e.g.*, Paton); a few are sympathetic towards CCA but are critical of particular points of the proposals (*e.g.*, Stamp); and some are advocates of exit price accounting (*e.g.*, Chambers). In a book of this nature, it is helpful to the reader to be able to identify, from the point of view of the editors, the "good guys" and the "bad guys." Obviously, the villains are proponents of CCA, but whom do the editors support? They do not state their preference, but by the selection of articles it appears that they side with Chambers and continuously contemporary accounting (CoCoA).

The book is divided into five sections: Introduction, Background to CCA, Theoretical Issues, Practical Issues, and Overview. The Introduction consists mainly of summaries of the specific proposals for CCA. In the section on Background to CCA, the intent of the editors appears to be to show the reader that CCA has been considered before and rejected by accountants, and should be rejected again.

The sections on Theoretical and Practical Issues constitute the substance of the book. Some of the important issues discussed by the various authors are as follows:

1. The notion of "value to the business." The Sandilands Report endorses the concept of "value to the business" as the basis of valuation. The concept is challenged by several writers. Chambers, for one, argues that assets are valuable to a firm not only for use, as assumed by the Sandilands Committee, but also for other reasons, such as borrowing, cash received if the assets are sold, and, in the case of non-monetary assets, the potential hedge against inflation. These are "values," he asserts, which are ignored by the Committee.
2. Income and capital maintenance. A variety of issues relate to this topic. The locus of the disputes can be summarized perhaps by two questions: Does CCA help to maintain productive capacity as advocates claim? Under CCA, what is income?

With respect to capital maintenance, the issue of physical vs. financial capital is considered. Stamp mentions that the treatment of holding gains reveals the philosophy of capital maintenance which an accountant embraces. To exclude them from income is to preserve physical capital; to include them, as do Edwards and Bell, is to maintain the financial capital. Langdon questions whether, in the first place, there is a case for arguing that particular assets must be replaced or that particular productive capacities must be maintained. Another issue covered is whether depreciation allowances, as prescribed in the proposals, maintain the firm's operating capability. Chambers contends that they do not, because "backlog" depreciation is not charged against revenue.

The Sandilands Committee claimed that the employment of industry indices to determine current cost will adequately account for technological changes. Surprisingly, the problem of changes in technology in relation to the meaning of physical capital is not debated. Lemke deals with the subject of technological changes, but his main concern is the use of the income figure as a predictor of the firm's prospects. In this connection, he points out that Edwards and Bell admit that their system provides only for the evaluation of the existing mode of production.

With respect to income, a number of authors find fault with the proposals for ignoring changes in the general price level. The contention of the Sandilands Committee was that the notion of "value to the business" implies interest in the effect of prices on the specific firm only, not the effect in general. The suggestion by some that adjustments for changes in the general price level should be incorporated into the CCA system is challenged by Clarke, who believes it is "technically impossible." His reasons are that the values, under the proposals, are not homogeneous units of money and that some of them do not represent identifiable amounts of purchasing power. Another issue debated is whether holding gains/losses and purchasing power gains/losses should be included in income. Thomas's allocation problem is also discussed with regard to depreciation.

3. Measurement. Under the proposals, net realizable value (NRV) and present value (PV) are allowed, as well as replacement cost. Supporters of CoCoA argue that the different values are not additive because the three are of separate domains. In one article, Chambers states that NRV is not "money like" on the Balance Sheet date, because it involves expectations and that no specific time horizon is spelled out; therefore, NRV is "hypothetical" (p. 96). Yet, in another article, he says "NRV is a sum of money accessible at a stated date," and therefore cannot be compared with PV since the latter is a "computed expectation" (p. 111). This inconsistent explanation of NRV certainly needs clarification. Chambers further contends that in any given statement one cannot compare "a fact and an expectation" (p. 111). If this is true, then what about comparisons which are made between budgeted figures and actual results, and of variance analyses in cost accounting?

In summary, this very informative book is a convenient source of the "con" of CCA. It would serve well as a reference book in a graduate theory course.

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DON T. DECOSTER, KAVASSERI V. RAMANATHAN and GARY L. SUNDEM, Editors, *Accounting for Managerial Decision Making*, Second Edition (Santa Barbara: Wiley/Hamilton, 1978, pp. viii, 438, $16.95 cloth, $10.95 paper).

Most managerial accounting textbooks fail to provide adequate discussion of the interaction between the accounting and managerial processes, the editors argue. They state two major objectives: (1) to interface the accounting measurement process with utility theory, decision theory, microeconomics, operations research, and other disciplines related to the management process; and (2) to enable students to focus on broad policy and theoretical issues, the implications of which may transcend specific accounting techniques. Their stated choice criterion for readings is ease of understanding, such that a mathematical or other technical background is not required on the student's part.

This book of 35 papers is divided into eight sections, which parallel the first edition, except that the original sections eight and nine have been combined. By including 15 different articles in the current edition, the sections on long-run decision making and formal control processes are notably changed.

One of the book's advantages is declared to be that "approximately twenty-five (of the articles) come from journals not typically found in non-research-oriented libraries." (p. vii). Presumably, potential adopters would have the ability to draw some sources otherwise not available. In order that prospective users might judge for themselves on this matter, the following are the sources from which the book's articles have been drawn and the number of selections from each: *Abacus* (2), *The Accountant* (1), *The Accounting Review* (4), *The Australian Accountant* (3), *Business Budgeting* (1), *Cost and Management* (3), *The CPA Journal* (formerly *The New York Certified Public Accountant*) (2), *Financial Executive* (3), *IEEE Transactions on Systems Science and Cybernetics* (1), *The Journal of Accountancy* (1), *Journal of Contemporary Business* (1), *Lloyd's Bank Review* (1), *Management Accounting* (4), *Management Services* (4), and *Managerial Planning* (3). The source of one paper was not stated.

The editors indicate two ways in which the book might be used: (1) as a companion text for undergraduate or graduate managerial accounting courses, and (2) as a "springboard for discussion" in case- or seminar-oriented courses at the same levels. To facilitate its use in the former manner, the preface contains a table which cross-references each reading with "four popular texts," one managerial (DeCoster and Schafer) and three cost accounting textbooks (Horngren; Matz and Usry; and Shillinglaw).

In reviewing the book's first edition, Crooch (*The Accounting Review*, January 1975, pp. 212-13) commented that "The review of a readings book all too often reduces to a thesis on how the readings selected do not fit the established biases of the reviewer" (p. 213). He proceeded to rate each of the papers according to their percieved usefulness for the basic cost accounting course. In doing so, he used essentially three categories: definitely useful; useful, if time permits; and not useful. This reviewer repeated this procedure on the current edition, distinguishing further between the introductory managerial accounting course (IMAC) and the basic cost accounting course (BCAC) for the sake of those whose curriculum includes both such courses. The results were as follows:

	IMAC	BCAC
Definitely Useful	10	4
Useful, If Time Permits	14	8
Not Useful	11	23

The potential usefulness of the readings in the second edition ranges from 10 to 24 articles for the IMAC and from 4 to 12 articles for the BCAC. Such ratings are very subjective, being sensitive to this reviewer's personal biases and perceptions about the nature and scope of the aforementioned courses. A more meaningful assessment can be obtained from one who has used the articles in the classroom.

The editors have prepared excellent introductions to each section of the book, reinforcing their theme and helping the reader to integrate and to assess the papers' merits. These commentaries, except for the new articles, are *verbatim* reproductions from the first edition. On the negative side, three problems exist. First, the age of the readings is troublesome. Of the 34 dated papers (one was not dated), publication dates range from 1964 to 1976, the median being 1971. Although the non-research emphasis of the book should lessen somewhat the effect of time on usefulness, the selections cannot be rated "very contemporary." Second the authors have failed to achieve a group of readings which meets the stated choice criterion. With articles on decision theory, marginal economic analysis, linear programming applications, forecasting techniques, and other similar topics, one can hardly expect simplicity of reading. Thus, care should be exercised by potential users in the matching of assigned readings to the academic preparation of their students. Finally, and perhaps of primary importance, the cost of this edition may be prohibitive. Given the results of rating papers, described earlier, the cost effectiveness of assigning the book as a required reference would be dubious, particularly in the cost accounting course. Again, this is a matter of judgment for the individual instructor and should take into account the institution's library holdings.

In conclusion, this reviewer agrees with the book's editors that a need exists to extend traditional textbook coverage of managerial and cost accounting to the decision-making interface. Some instructors find case studies and other pedagogically-active means to be useful vehicles for this purpose. Others are more comfortable assigning readings for discussion. For those who fall into this latter category, the current edition of this book provides a broad array of papers in a well-edited, though costly, format.

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JAMES DON EDWARDS, ROGER H. HERMANSON, and R. F. SALMONSON, *Financial Accounting: A Programmed Text*; and *Managerial Accounting: A Programmed Text*, Fourth Editions (Homewood, Illinois: Richard D. Irwin, Inc., 1978, pp. xv, 733 and xiv, 560, each $14.50).

Considerably different from previous editions, the move has been to two separate programmed volumes intended to provide flexibility to prospective adopters to use both texts or either one without having to adopt the other. A major rearrangement of the chapters has been made. For example, two chapters on the statement of changes in financial position and analysis and interpretation of financial statements were moved from *Accounting II* to the new text entitled *Financial Accounting*, and a new chapter was added dealing with consolidated financial statements. Although the intention is to offer flexibility to adopters, many schools may not have the opportunity to experience such flexibility. The dividing line between financial and managerial accounting is not sharp. Some schools have tried to move certain topics, especially those dealing with the analysis and interpretation of financial statements, from the financial accounting course to the managerial accounting course to allow students to have more understanding of the increasing number of financial accounting topics.

The two texts are intended for use in the first two courses in accounting and may be covered in two quarters or semesters. The *Financial Accounting* volume, compared with similar traditional texts, is well written and organized, with the level of difficulty considerably reduced from the previous edition. With 14 chapters, the book is divided into four parts: the accounting cycle, items appearing in the statement of financial position (balance sheet) and their effect on revenue and expenses, analysis and interpretation of financial statements, and the basic theory underlying financial statements and consolidated financial statements.

Although not commonly used, the titles "The Statement of Financial Position" and "Earnings Statement" are given instead of "Balance Sheet" and "Income Statement." Since the reviewer personally prefers the authors' titles, he hopes that their usage will increase, as they can be meaningfully linked with "The Statement of Changes in Financial Position" and "The Statement of Retained Earnings." The book is flexible in assigning materials, as additional topics are included in 14 appendixes. The chapter on financial accounting theory might be somewhat advanced since it is generally considered part of the intermediate course.

The 14 chapters of the second text are divided into five parts: managerial cost concepts, cost accumulation and control, performance measurement and decision making, planning and control through budgets, and computers and decision models.

Classification of textbooks into parts is usually done according to certain criteria, objectives, or philosophies. However, the objective of classifying this text into the above mentioned five parts is neither explicitly stated nor clearly observed. Except for the chapter which covers quantitative and statistical methods, the materials covered in the text are similar to those covered in traditional managerial accounting texts. Contrary to the objective of a programmed text, the inclusion of this chapter does increase the role of the instructor rather than relieve him from explaining some of the material. The oversimplification of quantitative methods and statistical techniques in one chapter complicates the task of the instructor. These materials might be deferred to more advanced texts or included in appendixes.

In summary, the basic features of programmed texts are retained in that they start each chapter with a statement of learning objectives and conclude with a summary and glossary of terms. As programmed texts, they do an excellent job of reinforcing the materials covered in each chapter. The questions, quizzes, exercises, and the two sets of problems are sufficient to reduce the student's dependency on the instructor. This, in turn, can leave the instructor with enough flexibility in class time to emphasize and explain the more difficult material. Compared with earlier editions, the texts have benefited tremendously from previous criticism, and the chapters have been rewritten and rearranged to increase the level of clarity.

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LOUDELL O. ELLIS, *Church Treasurer's Handbook* (Valley Forge, Pa.: Judson Press, 1978, pp. 144, $6.95).

Non-accountants who are involved with the finances of a church will find this concise manual a valuable aid. It was developed to familiarize the accounting neophyte with the basics of bookkeeping and record-keeping, and the preface indicates that independent auditors or professional accountants may be interested in this work.

The first 90 pages discuss the basic tenets of bookkeeping. An adequate job is done considering the paucity of space. The reviewer agrees that the writing is "for those with little or no formal training in accounting." But the claim that "with careful study of the material such persons can gain competence in accounting and reporting practices," is not justified since the user of this manual would be required to spend considerable time and effort to accomplish this objective. There are no exercises in the book and only limited explanations. The reader would also require an instructor, accountant, or someone versed in the art of bookkeeping. One alternative would be to use this book in conjunction with an introductory accounting textbook. The work provides an excellent insight into the bookkeeping requirements of a church organization. The 51 exhibits include accounting forms peculiar to church activity as well as completed books of original entry which would serve as an excellent guide, including forms used in purchasing, payroll, and for financial statements. One can agree that "Professional accountants may find chapters 2-6 helpful also when designing church accounting and reporting systems."

Fifty-four pages are devoted to "special topics in church accounting" and include budgeting, internal control, auditing of church accounts, special purpose reports, tax on unrelated business income, and accrual basis accounting and reporting. There are 13 exhibits in this section. Well-made selections of illustrations include those items that would be of interest to finance officers in a church organization. The chapter on a church budget gives specific instructions on budget preparation, concluding with a sample of a completed budget. The internal control chapter includes an 87-item checklist that would prove invaluable as a guide toward the preparation of an internal control questionnaire. An "Auditing of Church Accounts" chapter includes a fairly detailed audit program and guidelines for an auditor's report. The chapter on special purpose reports discusses forecasts and several types of analyses. The discussion of tax on unrelated business income should prove especially useful to churchmen. There are many references that would be of interest to researchers in this area. An insight into the accrual basis and the impact of the change from cash to accrual on the books and statements is provided.

There is a necessary glossary of terminology. The definitions are brief and are written in non-technical language. The index is complete and representative of the text content and should be useful for quick reference. The bibliographic references throughout should prove to be especially helpful.

Written for the lay person, the book should not bore the expert accountant and certainly meet the objectives set forth in the preface and would satisfy the needs of the church treasurer.

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CHARLES T. HORNGREN, *Introduction to Management Accounting*, Fourth Edition (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1978, pp. xxii, 643, $14.95).

As a model for other authors in the field to emulate, this text, as in previous editions, is laconically written and easy to read. For a foundations course geared to undergraduate or graduate students, coverage of the subject matter is, for the most part, thorough and extensive.

The organization of the chapters has been markedly altered from the previous editions. The four chapters on the fundamentals of financial accounting, which comprised the first section in previous editions, have now been appropriately relegated to the rear of the volume, in light of the book's focus on management planning and control. Another significant change is that the topic of relevant costing appears in the current edition immediately following the chapters on cost-volume-profit analysis and manufacturing costs, which represents a logical reorganization, since all of these topics are concerned with the contribution-margin approach to income reporting and cost terminology. Additionally, relevant costing is covered in two chapters instead of one in this edition, allowing for more manageable treatment of this subject especially at an early point in the course. That relevant costing has never been integrated formally in this book with the discounted cash-flow approach to capital budgeting is, however, a source of confusion to students. Furthermore, in contrast to previous editions, the two chapters dealing with capital budgeting are not presented right after those on relevant costing in the current edition.

Although the author adopts an interdisciplinary approach, generally he does not clearly and specifically describe the varied role of the management accountant in connection with the allied disciplines considered in the text, such as finance and marketing. The rationale for the inclusion of these topics in an accounting course could be explained more persuasively, and restated for reinforcement throughout the book, to student readers who will encounter such topics again and again in other courses. Moreover, the extent to which the management accountant is a decision-maker rather than a data-provider—an issue that students often inquire about—is not adequately discussed in this text.

Despite the use of the cost-benefit approach as a recurring motif in the book, there is insufficient connecting tissue among the chapters in terms of other possible themes, such as: the problem of uncertainty in accounting, the short-run versus the long-run, controllability and accountability, cost-volume-profit analysis, and the concept of relevant costs. A closer linkage among the chapters could be forged by periodic reiteration of such themes and explanation of their applicability to particular topics. For example, linear programming (in Chapter 16) and cost-volume-profit analysis (in Chapters 2, 4, and 5) are not adequately integrated in the text; linear programming is not clearly linked to the material dealing with CVP analysis and the concept of opportunity costs in previous chapters. In addition, there is no evident attempt to compare zero-base budgeting with flexible budgeting.

Coverage of the behavioral sciences in this book is better organized and much broader than in previous editions as well as generally superior to that found in competitive textbooks. Nevertheless, the treatment of the accounting interface with the behavioral sciences leaves something to be desired. The behavioral consequences of instituting new accounting systems and the problems of communicating accounting data need greater emphasis. So, too, does participation in budgeting among employees. Additionally, there should be a discussion of the hypotheses of functional fixation and information overload.

Other features of the book are worth noting. There is an ample glossary of important terms in management accounting. In addition, the salient points and the exhibits in each chapter are presented in bright red and pink, making the book visually appealing. Furthermore, the solutions manual includes proposed course outlines, suggested test problems, and even the author's commentary on his own teaching methodology. However, there are insufficient references to current articles and other sources in many of the chapters.

In summary, the above critical commentary notwithstanding, this book provides a carefully prepared and well-organized exposition of management accounting primarily for the first-year undergraduate or graduate student concentrating in accounting or another business discipline. On balance, the topics are covered in an effective and efficient manner. To encourage students to apply concepts rather than regurgitate them seems to be the implicit aim of this text, which it fulfills admirably. The wide variety of challenging problems in this book, including many dealing with non-profit organizations, should evoke students' enthusiasm.

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The Institute of Chartered Accountants in England and Wales, *Survey of Published Accounts 1977* (London: The Institute of Chartered Accountants in England and Wales, February 1978, pp. 241).

This annual survey presents not only an analysis of methods and examples of financial reporting used by major British companies, but also a guide to current accounting thought in the United Kingdom. On several important subjects, a brief history of the development of such thought is also provided, and a separate section brings the information quite up to date. For example, the section on inflation accounting refers to such important publications as the Provisional Standard (1974) that recommended current purchasing power (CPP) accounting; the Sandilands Committee report (1975) that recommended current cost accounting (CCA); and Exposure Draft 18 (1976) that made specific suggestions for the implementation of CCA. This information is further updated by a detailed summary of the guidelines issued by the Accounting Standards Committee in November, 1977, that blend the ideas underlying both methods of inflation accounting—CPP and CCA—in a unique manner not yet seen in American literature.

Another interesting example is provided by the section *The Corporate Report*, which is a discussion paper published by the Accounting Standards Committee in 1975. With the objective of meeting the needs of the users, it recommended certain additional information to be included in company reports, and has been followed up by two government publications. The last of these is a consultative document, "The Future of Company Reports," published by the Department of Trade in July, 1977. This document proposes that the annual reports and accounts of large corporations should in the future contain the following elements: a value-added statement; an employment statement; more comprehensive financial accounts; more detailed disaggregation of activities; and an international trade statement.

The main part of the survey covers 300 large industrial companies, representing over 75 percent of the total equity market capitalization of British companies quoted on the Stock Exchange, though only 13 percent in number of such companies. Each section of the survey first discusses the accounting requirements relating to the topic, and then provides tables analyzing the methods used by companies. The tables indicate the number of instances of the use of various methods during the year to June 30, 1977, with comparative figures for the preceding year. In numerous cases, figures for the earliest year for which information is available are also provided. This highlights significant trends in reporting methods over a longer—though nonuniform—period. Non-mandatory information, such as statements adjusted for inflation and information recommended by *The Corporate Report*, is also included in the analysis. The tables are followed by excerpts from published statements. The emphasis here is to illustrate the treatment of an item in a variety of ways by different companies.

In addition to the main part of the survey, there are two separate sections which present the results of more limited surveys of the published statements of property companies and investment trusts.

As a counterpart of the American publication, *Accounting Trends and Techniques* (ATT), it has many similarities. But there are significant differences, particularly in regard to the following matters:

(1) *Survey of Published Accounts* (SPA) contains more detailed summaries of accounting requirements, and, in some cases, also a history of their development. Furthermore, the scope of the summaries is much wider, including: statutory requirements; dis-

closure requirements of the Stock Exchange; statements of standard accounting practice—both mandatory and nonmandatory; exposure drafts of such statements in issue; and recommendations of the Institute of Chartered Accountants in England and Wales. ATT contains brief summaries only of generally accepted accounting principles and requirements of the Securities and Exchange Commission.

(2) There is almost an equal emphasis in SPA on international accounting standards. The statements and exposure drafts referred to above include not only those issued by the (UK) Accounting Standards Committee, but also those by the International Accounting Standards Committee. Furthermore, information relating to the implementation of the Directives adopted by the EEC Council of Ministers is also provided. ATT makes no reference to international standards.

(3) The analysis contained in SPA and in ATT differs significantly because of differences in emphasis and disclosure requirements in the two countries. For example, under Income Statement, ATT analyzes 14 different items, while SPA has only five sections; results of associated companies, depreciation of fixed assets, research and development expenditures, taxation charges, and earnings per share. Under Balance Sheet, ATT has 28 sections plus two sections under Stockholders' Equity; SPA has only nine. Analysis of Statement of Changes in Financial Position and Auditors' Report are also much more extensive in ATT than in SPA.

(4) The size of SPA is much smaller and handier than ATT.

This publication should prove to be a useful work of reference to those interested in international accounting generally, and particularly to those who want to keep abreast of current developments in the United Kingdom—in such crucial areas as objectives of financial statements, methods of inflation accounting, and social accounting.

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PAUL JONAS, *Taxation of Multinationals in Communist Countries* (New York: Praeger Publishers, 1978, pp. x, 88, $15.00).

This short book provides a non-detailed summary of the fiscal regulations affecting Western corporations in five European socialist countries: Yugoslavia, Romania, Hungary, Bulgaria, and Czechoslovakia. The author tries to strike a balance between a theoretical and a pragmatic discussion.

Both the United States and the Soviet Union have been trying to restore normal commercial and business relationships between the two countries. Some Soviet-type countries use a joint venture as an instrument of business association. A joint venture is "a partnership of cooperative agreement between two or more partners, which is restricted to a single specific undertaking." (p. 14).

The third chapter provides a discussion of the characteristics of the joint business ventures in Yugoslavia, Romania, and Hungary. In each country 51 percent of the joint venture must be owned by domestic capital (*i.e.*, Soviet-bloc controlled). Obviously, U.S. corporations prefer to use wholly owned subsidiaries, but this form of involvement is unacceptable to the European socialist countries. The profit of a foreign partner is subject to the following tax rates: 35 percent in Yugoslavia, 30 percent in Romania, and 40 percent in Hungary.

The following questions are investigated for the five European socialist countries:

1. The nature of limitations on the formation of foreign associations in key sectors such as banking, insurance, transportation, public services, and strategic raw material resources;
2. The types of business organizations (for example, corporate, partnership, branch office) in which foreigners may participate, and the definition of taxable income applied by the Eastern European countries in each case;
3. Types and rates of tax "normally" levied on corporate income and potential tax holidays;
4. Treatment of depreciation allowances;
5. Provision of investment credits and other capital subsidies;
6. Taxes on profit remittances, interest, and royalties to non-residents; and
7. The extend to which export profits are preferentially taxed.

Chapter 2 provides a model of Soviet-type taxation. These socialistic tax systems are characterized by the dominance of excise taxes levied on consumer goods. In essence, a distorted price system makes inputs cheap and consumption expensive. The excise tax plus the compulsory purchase of governmental bonds puts a continual squeeze on the population and keeps the standard of living relatively low. Snowflake diagrams in this chapter illustrate the distribution of employment across the major sectors of the various economies, and these diagrams can be used for analysis and prediction of growth potentials.

The bulk of the book is in the fourth chapter. There is a discussion of the taxation of the foreign share in each of the five European socialist countries. However, only Yugoslavia, Romania, and Hungary have issued legislation to allow equity-style joint business ventures with Western countries. In Yugoslavia, there is a decentralized market socialism where the most important success indicator is the profit of the enterprise (p. 74). Workers' councils have power (*i.e.*, not a centrally planned economy) in Yugoslavia, so this country has the most potential for international economic cooperation with the United States.

Bulgaria is more in line with the Soviet pattern and is reluctant to allow joint ventures between domestic entities and Western companies. Further, doing business with Czechoslovakia is extremely difficult for Western firms, for the political atmosphere is chilly, and there is little chance of relaxation of highly restrictive methods.

The fifth chapter contains an excellent summary of the regulations related directly or indirectly to taxation in Yugoslavia, Romania, and Hungary (pp. 76-78). In his table of the statutory corporate income tax rates of Western countries, only three Western countries have higher statutory rates than the U.S. Obviously, statutory tax rates may have little relationship to the effective rates.

For the individual with an interest in foreign taxation, this is a worthwhile short summary. Since no mention is made about updating the material, other sources will have to be consulted when determining the current regulations in these five countries. The author did meet his goal of outlining the fiscal rules that apply to foreign corporations in the five European socialist countries (p. 3).

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JOSEPH A. MACIARIELLO, *Program-Management Control Systems* (New York: John Wiley & Sons, 1978, pp. xviii, 220, $19.95).

The purpose of the book, as stated by the author, was to develop management control systems for complex programs. Specifically, he sees program controls as including the managerial functions of planning, organizing, decision making, and control. Formally, he defines the entire process as the program-management control system.

The author distinguishes complex from noncomplex programs in three ways. First, they may require high technology for accomplishment. Second, they are usually poorly structured. Finally, they are often massive in scope. Complex programs require the integration of highly specialized disciplines of an organization for large numbers of interrelated tasks. The author's solution to this situation is to develop a system using the program-management control approach.

The book consists of 14 chapters divided into three parts. Part I covers the structure of program-management control systems. The author deals with the requirements that complex programs impose upon the design of the organizational structure of a system. Part II emphasizes the process of program-management control. Part III examines various control problems and possible solutions. Overall the author achieved a good balance between the required tools and different organizational processes necessary to achieve an operational program-management control system.

The author's approach to the design of program-management control systems begins with the establishment of goals and objectives of the organization. The second step is to identify explicitly a market strategy. Given the goals and strategies, the final step is to identify the crucial variables. The decisions reached about the first three areas should influence significantly the design of the system's organization and reward structure. Specific emphasis is given to the behavioral mechanisms that make the total system functional. The general management control system developed by the author is intended to be flexible enough to provide guidance to meet the situational requirements of any organization. However, the author stresses that managers should be careful not to conclude that a specifically designed program-management control system functioning well for one organization will work for another. Instead, the general process should be repeated for each specific organization.

Using the Flesch formulas for reading ease, level of abstraction, and human interest on a random sample of the book, I analyzed the author's writing style. The reading ease test indicated a very difficult level, making the book only appropriate at the graduate level. The book tended to be fairly abstract and at times might be hard to follow. In terms of human interest the book was relatively dull; most readers would have difficulty identifying with it behaviorally.

A comparison of *Management Control Systems* by Anthony, Dearden, and Vancil with Maciariello's book is appropriate for two reasons. First, Maciariello states that *Management Control Systems* most influenced his thinking on the general subject of management control. Second, because *Management Control Systems* has been so widely accepted.

Maciariello's book is multi-dimensional in framework and deals with complex activities; Anthony, Dearden, and Vancil's book tends to be one-dimensional and deals only with noncomplex activity. Maciariello has developed in his book a general framework for program-management control systems that integrates the separate disciplines used in practice into an interrelated system that applies to the management of complex projects, products and services. Maciariello's approach allows for activities of organizations to be planned and controlled in terms of both financial and behavioral performance; Anthony, Dearden, and Vancil's approach allows only for activities to be planned and controlled in terms of financial performance. Maciariello has certainly made a substantial contribution by advancing knowledge beyond the level addressed by Anthony, Dearden, and Vancil.

The book is the best policy-making operational-control book available today at the graduate level. The author succeeded in accomplishing the objectives he established for the book. The book contributes significantly to the development of management control systems of complex programs in a multi-dimensional way. It is versatile because it was designed to be used by general and functional managers, controllers, and students. Two obvious uses for the book would be in a course for controllers or in an advanced managerial accounting course. The author has done a good job of using his vast experience to provide ample illustrations and examples. Although the book does not include cases, the author provides a list of suggested cases available through ICCH in the appendix. Some may consider this a disadvantage.

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Walter B. Meigs, A. N. Mosich, and Charles E. Johnson, *Intermediate Accounting*, Fourth Edition (New York: McGraw-Hill Book Company, 1978, pp. xx, 1132, $17.00).

The rapidly expanding number of complex technical financial accounting and reporting problems raises a serious question of whether it is still possible to cover every important detail in a two-semester intermediate accounting course. The authors have chosen to emphasize thorough coverage of major topics with numerous illustrations of accounting requirements. They have chosen not to include details on some of the more complex technical issues, such as lessor accounting for leveraged leases and the interest amortization method applied to bonds issued between interest dates or to partial retirement of bonds.

In the fourth edition, the authors have continued their emphasis on a combination of accounting concepts and analysis of problems that arise in applying these underlying concepts to financial accounting and reporting. The book, designed for use by accounting majors who have completed an introductory financial accounting course, has been carefully revised to include current terminology and recent developments in financial accounting. Students should find the text easy to read and numerous highlighted illustrations make most issues self-explanatory. The large number of chapter questions and exercises are well keyed to chapter topics.

Several format and content changes have been made from the previous edition. Throughout the book, there is an increased emphasis on the objectives of financial statements, using recommendations of the AICPA study on financial statement objectives. Coverage of SEC regulations as applied to financial statements has been expanded. The concept of present value and accounting applications is now presented in Chapter 5 rather than in an appendix. This permits much better integration of present value concepts where appropriate in subsequent chapters. Inventory coverage has been reduced from three chapters to two chapters. This change was accomplished by reorganization of topics and by elimination of much of the material on inventory management, planning, and control. Throughout the book, less emphasis is given to management planning and control than in the previous edition.

The textbook is well organized following the general pattern of a balance sheet as found in most intermediate accounting courses. The table of contents uses subheadings to highlight chapter content and is quite useful for reference to specific topics. Several accounting concepts such as interim reporting and replacement cost data are introduced in early chapters where they are appropriate and covered in more detail in later chapters. Cross references in the early chapters inform the reader that more detail coverage is available elsewhere in the text. The practice of integrating special requirements throughout the text, often before detailed coverage, is a useful and effective way of providing students with a good perspective of the accounting issue involved. The material is handled well and should not be confusing to students. However, teachers using the textbook for the first time should carefully review the total text to determine where best to cover specific topics in detail and to avoid the awkwardness of expanding on a topic early in the semester only to discover later that it is covered in more detail in subsequent chapters.

The topical chapter outline is similar to most intermediate accounting textbooks. The discussion of reversing entries in Chapter 2 has been simplified and is clearer. Chapters 3 and 4 on financial statement preparation are much more than a review of material from an introductory course. Several major topics are introduced and covered in this chapters. For example, the basic accounting and reporting requirements for extraordinary items and prior period adjustments are in Chapter 3. Reduced emphasis on managerial planning and control from the previous edition is most apparent in the cash and inventory chapters. Cash flow analysis is now included with funds flow analysis in Chapter 24. Present value concepts are emphasized more in this edition.

Chapter 22, Accounting and Inflation, includes both price-level accounting and "fair value" accounting. Apparently, the authors intended the term "fair value" to mean a broad general concept of value including entry and exit values. However, the text is frequently confusing since the term "fair value" is often followed by "(replacement)." Adopters of this text should agree on definitions of terms to be used by their class.

The 10 to 12 problems in each chapter range from short specific computations to complex, multi-issue problems. The three to five cases in each chapter require more analytical reasoning rather than computations and should lead to good in-class discussion. The authors have made extensive use of revised CPA examination problems; however, unlike many other textbooks, these problems are not identified as "(AICPA adapted)".

This edition is an easily readable and very teachable text that provides good coverage of the major, general topics normally included in an intermediate accounting course. Since it is probably unrealistic to attempt to cover all technical details in an intermediate course, my preference in using a textbook such as this is to cover the general topics as included in the book and, each semester, select one or two topics to be covered in more detail using supplemental materials. For example, one such topic could be lessor accounting for leveraged leases. Students can be exposed to research on technical requirements by using FASB Statement No. 13 and other relevant materials to prepare answers to supplemental problem material. I believe this approach of using sample applications of technical research will have to be used more in future accounting instruction since more complex technical accounting and reporting requirements are being added to accounting practice than can be covered in depth in the classroom.

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MICHAEL F. MORLEY, *The Value Added Statement: A Review of Its Use in Corporate Reports*. Published for The Institute of Chartered Accountants of Scotland (London: Gee & Co. Limited, 1978, pp. x, 150, £3.95).

The Value Added Statement, a new development in Great Britain, is currently presented by approximately one-fifth of the major British companies. The popularity of the Statement is due, in part, to a recommendation in *The Corporate Report*, published in 1975 by the Accounting Standards Committee and the apparent intention of the British government to make the Statement compulsory for all large companies.

The objectives of this book are (1) to provide an introduction to the nature and purpose of the Value Added Statement, (2) to assist accountants in preparing the Statement, and (3) to discuss the problems and controversies relating to the development of uniform standards for the presentation of Value Added Statements.

The economic concept of value added is the wealth created by the firm as measured by the increase in market prices of the goods and services it produces. The accounting concept is similar except that the measurements are obtained using the same procedures currently used for the profit (income) statement. Value added is the excess of sales (revenues) over bought-in items (purchases of goods and services). Value added is then shown as distributed to employees, providers of capital, government, and the amount used to maintain and expand assets (depreciation plus retained earnings).

After an initial chapter, the author discusses in three chapters the concepts and misconceptions of the Value Added Statement, followed by its advantages and disadvantages. According to the author, the advantages have relevance to the poor performance of the British economy in recent years. Advantages of the Statement include an improvement in "team spirit" within the company by including workers among those who benefit from increased productivity, thus directing attention to the employees' share of value added as well as the government's share. It also provides a measure of the size and importance of the company and its contribution to national income.

The author expresses a hope for a change in the attitudes of management to that of playing a mediative role between labor and capital and for an improvement in morale that should follow (pp. 19-20). However, he expresses (p. 30) the opinion that a de-emphasis on profits would have sinister implications and that the objective of management should not be to maximize value added, as this might come only at the expense of the providers of capital. However, if emphasis is to be placed on obtaining a team spirit and if management should act as mediator, the objective should not be solely the maximization of profit but rather Pareto optimality of value added. That is, the objective should be to maximize value added without decreasing the share to any of the beneficiary classes.

Chapters 5, 6, and 7 discuss problems of classifications and definitions relating to both the bought-in items and the beneficiaries of value added. The author is to be commended for suggesting that allocations of fringe benefits to workers and indirect taxes to separate beneficiaries would be arbitrary and might thus lead to disputes and less reliable information. However, the suggestion that depreciation be subtracted to arrive at Net Value Added would not seem to be an improvement because of the arbitrary nature of depreciation even though it is an improvement conceptually.

Chapter 8 discusses the effect on the Value Added Statement of inflation adjustments. The author points out that the purchasing power gain on long-term debt is shown clearly in this Statement as a transfer of purchasing power from the lenders to the shareholders. Another important point is that costs of preparing statements should be compared with their value, particularly in the case of segmental reporting.

Other topics discussed include the audit of the Value Added Statement, its application to selected forms of business entity including nationalized industries, and the relevance of value added ratios. The author concludes with the optimistic prediction that "the Statement may well make some contribution to the diagnosis and even to the cure of the British industrial disease suffered over the past three decades."

This book should be of greatest interest to students, instructors, and practicing accountants in the United Kingdom. However, it should also be of value to persons in the United States and elsewhere who have an interest in international accounting, social accounting, or in new developments in financial reporting.

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KENNETH S. MOST, *Accounting Theory* (Columbus, Ohio: Grid, Inc., 1977, pp. xv, 385, $15.95).

This is a textbook in accounting theory for senior and graduate professional accounting students which, according to the preface, "was designed to assist accounting students to make the transition from the ordered ways of the classroom to the unruly milieu in which they will earn their bread." Some might prefer to think of this in reverse, *i.e.*, the "unruly milieu" of the classroom in undergraduate financial accounting, in which theory becomes buried underneath an avalanche of statements, opinions, and interpretations, and of the (comparatively) "ordered ways" of accounting practice, in which accounting theory is largely ignored. In any case, given the need for a better grasp of theory by accounting practitioners, and given the lack of adequate attention to theory in most undergraduate accounting programs, one could hardly disagree with the author's motives in writing a text for an undergraduate course in accounting theory.

The documentation in each of the 17 chapters is extensive and carefully done; and long lists of "Selected Additional Readings" are most helpful to the ambitious student. The average chapter length is about 20 pages.

The reader will find it useful to think of the first six chapters as providing a conceptual, institutional, and historical framework for the chapters to follow, which (except for the last chapter on current problems) deal primarily with measurement issues. In the preface, the author describes the structure of the book; "a subject or concept is introduced in one chapter and then taken up again for in-depth examination in a subsequent one." This structure did not always come through, although this fact does not detract from the value of the book as a text. However, in at least one instance, the author promised a discussion (of the efficient market hypothesis) in a subsequent chapter, but never really delivered on his promise.

Several features of the book make it ideally suited for its purpose. The author does not talk down to the student reader, and yet most of the book is highly readable. A good course in intermediate accounting provides the necessary accounting prerequisite, and a reasonable background in undergraduate economics should be sufficient. The approach to accounting theory leans heavily on historical and institutional supports for its points of departure, and students will be weak in these areas, but *Accounting Theory* provides sufficient summaries of the main sources (*e.g.*, Irving Fisher, Edwards and Bell, APB Statement No. 4, Trueblood Report) that the analyses of their contributions should be understandable.

A Resource Manual accompanies *Accounting Theory*, to serve primarily as a reading aid, and consists of long lists of study questions to point students to "important propositions." Hopefully this will be re-done when the book is revised, and perhaps greater care can be exercised in in selecting the questions. By conservative estimate, there are 2500 questions, not all of which are likely to be of first importance.

The entire book could be covered possibly in a three-credit, one-semester course, or possibly one quarter course, without resorting to unreasonable reading assignments. This assumes that the text will be used without substantial outside reading, and that students will have at least the academic prerequisites suggested above.

In this sense, *Accounting Theory* is a pioneering work. Other books on accounting theory are intended as research or reference works or as supplementary texts, usually in graduate seminars. The general demand for a basic text in this area has not yet been demonstrated, because most undergraduate accounting majors and fifth-year students preparing for professional accounting careers as well as the CPA or CMA exams do not have time for a course in accounting theory. The market reaction to this book should be of interest as well as how schools adopting it find the space in the curriculum for the course.

The book has shortcomings, most of them the result of sacrifices necessary to keep it as a usable text. As a research document, it does not stand up very well, partly because it gives scant attention to the more recent research in financial accounting, the relevance of which to standard-setting has yet to be demonstrated. The author's view is in this paragraph (p. 85):

> During the nineteen-sixties a mini scientific revolution appears to have started to bring some order into the chaotic situation. This phenomenon, which will be described in subsequent chapters, has been characterized as "*a priori* research in accounting," because it consists of hypotheses concerning accounting different from those underlying generally accepted accounting principles, but unaccompanied by any suggestions as to how they can be tested. There now exist two separate communities in accounting. . . .

Some of the "*a priori*" research is briefly mentioned, but not given the attention it deserves.

Much of the book is argumentative rather than authoritative. The author argues strongly on a number of controversial issues, and although students are likely to benefit from the experience, probably they are not capable of weighing the arguments and drawing their own conclusions without more help than the author provides. Perhaps the most prominent example of this is Chapter 6, "The Objective of Accounting" in which the author thoroughly rejects the underlying assumptions of the Trueblood Report, and rejects the proposition that the resulting conceptual framework is necessary, or even helpful, in setting accounting standards. Discussion of both sides of this controversy is appropriate for this book, but it is too early to pass judgment on the work done thus far, and undergraduate readers will have little or no basis for deciding whether the author is right or wrong. Examples of other areas that need more attention to be convincing include the influence of neo-classical economics on accounting (Chapter 7 seems to emphasize the difference between economics and accounting net income, rather than the similarities), and the Social Consolidation Model as a basis for explaining liabilities (p. 222), in which the author seems to indulge himself in a little "*a priori*" research of his own.

These criticisms may simply be another way of asserting the impossibility of covering accounting theory in one volume. When, as in this case, the objectives are modified to include the preparation of a readable book appropriate for undergraduate accounting majors, the difficulties are compounded. On the other hand, the effort is well-worth making, and quite possibly and hopefully, the publication of *Accounting Theory* as a text will encourage the development of the course in more universities.

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RESEARCH COMMITTEE OF THE INSTITUTE OF CHARTERED ACCOUNTANTS IN ENGLAND AND WALES, *Analysed Reporting—A*

Background Study (London: The Institute of Chartered Accountants in England and Wales, 1977, pp. 211, £6.95).

"Analysed Reporting" is the term used in the United Kingdom to represent segment financial reporting by diversified companies. This study, completed in April 1976 by Adrian Lamb, a partner in the United Kingdom firm of Coopers & Lybrand, is concerned primarily with an examination of the extent to which diversified companies currently disclose, and in the future should disclose, segment or analyzed data. In addition to an investigation of the segment reporting requirements and practices in the U.K., information is also included for the United States, Canada, Australia, South Africa, the Netherlands, and Sweden. In particular, strong emphasis is placed on the contents of the exposure draft on segment reporting which was issued by the Financial Accounting Standards Board (FASB) in September 1975.

With respect to the scope of the research, the study did not attempt to survey companies in the U.K. as to the actual level of segment reporting or to the desirability and/or feasibility of extended segment reporting requirements. Neither were financial statement users questioned as to what specific segment information they consider valuable. Rather, the results of prior research efforts on the subject and existing published summaries of financial reporting practices in various countries, such as those contained in *Accounting Trends and Techniques* published by the American Institute of Certified Public Accountants, were utilized as evidence concerning the desirability and practicality of segment disclosure. One hundred and thirty-seven pages of the text are devoted to appendices which reproduce selected portions of the various sources which were referenced in the study.

The concept of segment reporting is not new in the United Kingdom. Both the Companies Act 1967 and the Stock Exchange Listing Agreement in the U.K. require certain segment disclosures. Generally, however, the implementation of the reporting requirements has been subject to varying interpretations by companies in the U.K., with the result that considerable variation exists in practice with respect to the segment information actually provided in external financial reports.

The study is divided into five sections. Part I covers current statutory and regulatory segment reporting requirements in the countries studied and provides a good overview of the extent to which the subject has achieved world-wide attention. Current segment reporting practices are examined in Part II. Since the sources of information in this section are limited to published surveys of corporate financial reporting practices, one limitation of this area is that the information presented is somewhat dated. For example, the 28th edition of *Accounting Trends and Techniques* referenced includes information for reporting years ended not later than February 1974.

Based on the various research articles and books utilized in this study, a debate of the major arguments for and against segment reporting is presented in Part III. After assuming that segment data should be presented, the remainder of this section deals with questions concerning the appropriate basis for segmentation, circumstances where segment information should be presented, what items in the financial report should be subject to segment analysis, and whether the segment information should be subject to the opinion of the independent auditor. Overall, this section provides a good summary of the issues and controversies which have developed over the subject of segment disclosure.

Part IV, "Current Developments in Other Countries," for the most part summarizes in detail the various reporting requirements as presented in the FASB exposure draft on segment reporting. The last section of the study presents the views of the author concerning the various issues surrounding the subject of segment reporting, and generally concludes that the approach taken in the FASB exposure draft is appropriate for use in the United Kingdom.

Overall, the study does not extend the state of the art with respect to segment reporting but, instead, serves as a useful vehicle to summarize the many issues and corresponding research efforts which have been identified and made in this area. Particularly valuable are the appendices which provide easy access to many source documents concerning segment reporting requirements and practices in different countries. The study would be most valuable perhaps to those wishing to develop a basic background and understanding of the issues involved in segment reporting.

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ISAAC N. REYNOLDS, ALBERT SLAVIN, and ALLEN B. SAUNDERS, *Elementary Accounting* (Hinsdale, Illinois: Dryden Press, 1978, pp. xiii, 988, $13.95).

With 988 pages, this book covers almost all you may want to know about elementary accounting but were afraid to put in your own text. It is clearly intended for a full-year course in the more historical "elementary" tradition rather than the financial/managerial combination. In fact, only five of its 28 chapters are related to what is usually considered "managerial."

Each chapter starts with a very short introduction, learning goals, a list of key terms is given, and concludes with a glossary, questions, class exercises, and problems. Generally speaking, all these fit together well and should be of benefit to student and teacher. Color is used well throughout the text.

The "package" itself is quite complete. There is an instructor's manual which for each chapter extensively summarizes major concepts, lists behavioral objectives, provides lecture notes, and describes and indicates level of difficulty for exercises and problems. This would seem an exceptionally valuable aid for beginning teachers, while experienced teachers may find it of limited value. In addition, the publisher provides a solution manual (661 pp.), a test bank (unit tests, midterms, and comprehensive exams), two practice sets, transparencies (solutions to class exercises, exercises, and problems and selected "teaching transparencies illustrating important figures and illustrations . . ."), and working papers (two volumes). A checklist of key figures is included at the end of the text. All of this clearly indicates that when Dryden obligated itself to vie in this competitive market, it jumped in with both feet.

The approach is from the single proprietorship form of business. In fact, corporations are not introduced until the last half of the text.

There are a variety of items that can be covered when a book is of this size. Contrary to some elementary texts, this one fully explains, in addition to traditional methods, subjects such as discounts lost, perpetual inventory, and reversing entries (in an appendix).

The authors get to the subject of subsidiary ledgers and controlling accounts quite early (Chapter 3), with which there is no complaint, although posting references in the journal could be quite easily overlooked (pp. 85-86) and are not recorded consistently (*cf.* p. 224).

The authors devote two chapters to adjusting entries and go into minute detail. Since this area is one of the more difficult ones for many students, the authors have clearly devoted much space to it.

Although relatively free of the curses that often plague first printings, the current printing still has two serious errors that will obviously be corrected quickly. But students who see highlighted on pages 70 and 103 that Cash and Accounts Receivable in a three-column account have (normal) *credit* balances may be a bit confused.

Often one is impressed with how extensively certain subjects are covered or with the number of illustrations or examples given. Use of a crossword puzzle as a problem in the chapter on Accounting Standards is another example of how authors can insert in a large text methods that might have to be eliminated in a more concise presentation. Other examples of "extras" are an illustration of the T-account method in the chapter on Changes in Financial Position. The chapter on Financial Statement Analysis and Interpretation is comprehensive for an elementary text. The text also has in greater detail than most beginning books the amortization of bond premium. The illustration of related subject of a bond sinking fund may lead one to comment how nice it is that the amount in the bond sinking fund ends up *exactly* equalling the maturity value of the bonds.

Those wishing to cover the "managerial" subjects in Chapters 23-27 may find that since these chapters average about one-third fewer pages per chapter than do earlier chapters, the thoroughness with which financial subjects were covered is not consistent in these later chapters. Certainly, the principles are clearly presented, but after having financial subjects so extensively presented, some may find the managerial presentation a bit meager.

The authors present price-level adjustments, replacement cost, and goodwill in an appendix, which is probably advisable in a text of this nature. Consolidations are also discussed in an appendix.

Each reader could find minor flaws or basis for criticism in almost every chapter. Often it seems that the authors have made a serious omission or error, but in a few pages or another chapter things are usually put right.

Certainly the book is comprehensive. It should appeal in the market to which it seems directed—junior colleges and many four-year schools. It would make a good reference book in those courses proceeding at a decidedly faster pace.

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RUDOLPH W. SCHATTKE and HOWARD G. JENSEN, *Financial Accounting*, Second Edition (Boston: Allyn and Bacon, Inc., 1978, pp. xiii, 638, $13.95).

This book, designed for use in the first part of a two-part course in introductory accounting is a very readable text and serves its purpose well. This purpose, the authors state, "is to give the student an introductory level of understanding of the accounting information found in the financial statements" (p. 9). To meet this purpose, the authors have divided the text into five parts.

In the preface they state "emphasis on the end products of the financial accounting process provides a rationale for students beginning their study of accounting and prevents students from confusing *accounting* with *bookkeeping*" (p. ix). This is accomplished in Part I, "The Framework of Financial Accounting," where the authors do an excellent job in presenting an overview of the purpose of accounting, including some of its limitations, in a very clear and concise manner. A complete set of financial statements is introduced in some detail, and they are related to the basic concepts of accounting which the authors have divided into (1) a tentative set of objectives, (2) basic assumptions, and (3) principles. This is done without regard to the accounting cycle, which is introduced in Part II. The three chapters in this section present the accounting cycle in a very straightforward manner. Placing the work sheet in an appendix allows the instructor to emphasize or de-emphasize it as he believes necessary, given the purpose of the course. It could, for example, be omitted in a course for non-accounting MBAs without affecting the rest of the material.

Assets, liabilities, and their related effects on income are discussed in the five chapters which comprise Part III. One of the high points of this section is a discussion of internal control for Cash, Sales, Inventories, and Purchases. This discussion helps to emphasize management's responsibilities with respect to the operations of the enterprise and the accumulation of accounting data.

Several weaknesses, however, are present in this section. The discussion of FASB Statement No. 12 in the chapter on investments could be expanded, especially in the areas of statement presentation, gain or loss on sale, and determination of the Allowance account balance in periods after the period of acquisition. The discussion on a change in the useful life of a fixed asset indicates that there is a choice between allocating the book value over the adjusted remaining useful life or treating the change as a revision of prior periods' expense. This is done without any discussion as to changes in accounting estimates or error corrections. One error appears where the authors state that "the APB, in its Opinion No. 29, ruled that no gain *or loss* on a trade of like (similar) assets should be recorded unless cash is received—an unusual occurrence when a company trades an old asset for a newer one" (p. 322). (Emphasis added.)

Part IV, "Owners' Equity," discusses the accounting for the sole proprietorship, partnership, and corporate forms of business organization including an excellent introductory-level presentation (except for one area) of business combinations. This exception is the suggestion that "the unallocated excess of book value over cost might be reported on the consolidated balance sheet as a general valuation account deducted from total assets under a title such as 'excess of subsidiary book value over cost'" (p. 412) without any mention of APB Opinion No. 18's statement that "an excess over cost should be allocated to reduce proportionately the values assigned to noncurrent assets (except long-term investments in marketable securities) in determining their fair values" (paragraph .91).

The last section, "Accounting Theory and Analysis," in addition to standard presentations on the Statement of Changes in Financial Position and analysis of financial statements, contains a chapter on the area of changing prices, both specific and general, and a chapter entitled "Accounting Theory: Importance, Development, and Prospects." Both chapters are excellently written. The chapter on accounting theory, however, will create the most controversy since it is unlikely that all instructors will agree with either the authors' evaluation of the present state of the profession or their conclusions with respect to its future. While these two chapters could be omitted without hurting the "bookkeeping" aspects of an introductory course, it is strongly suggested that they be included, since they will give the students some indication of the problems in, and the changing nature of, accounting.

The text is well written, and the questions, exercises, and problems are plentiful and appear to be well written and extensive in their coverage. On balance, its weaknesses are few and this text should be seriously considered for use in an introductory financial accounting course.

KENNETH P. HANKINS
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Kent State University

RAY M. SOMMERFELD, *Federal Taxes and Management Decisions*, Revised Edition, (Homewood, Illinois: Richard D. Irwin, Inc., 1978, pp. ix, 396, $17.50).

The revised edition of a 1974 book with the same title is written for students "who need only to *recognize* the important tax consequences that attach to many common business transactions." Accordingly, the book is intended for MBA students and accounting and law students who do not plan to become tax specialists. In the preface, the author states that he uses a "pragmatic" approach, emphasizing practical results (with little consideration of the economic, social, or political considerations), and that the book is in no way "comprehensive" (with inclusion of only the most significant of the most common transactions).

In format, the revised edition is quite similar to the original edition. Like it, the revised edition contains 14 topical chapters which can be read and understood independently, although the author suggests that Chapters 2, 3, and 5 be read before any subsequent material.

The material is presented in non-technical, easily understood language, something that should be appreciated by non-specialist tax students who might otherwise feel burdened with the complex technicalities and great detail common to much tax literature. Very few references are made to Code sections and to court cases. The latter contributes to simplicity, although the occasional person interested in further background study is not thereby aided.

Instead of including problems and short case assignments in each chapter, the author includes 12 cases in the back of the book. They are open-ended cases dealing with such broad topics as family and estate tax planning, transfer of property, raising capital, choosing a business form, *etc.* There appears to be no "solution manual" for the cases. This reviewer requested one from the publisher, but was informed that none was available. In the opinion of this reviewer, such a manual could be helpful to instructors, assisting in identifying relevant points in the cases. In addition to the 12 broad integrative cases already included in the book, this reviewer believes that it could also be helpful to have short cases in each chapter that might be discussed as one proceeds though the book.

The book includes a supplementary reading list, by chapter, which should be of use to those wishing to go into more depth on particular topics.

The text is interesting and readable; the examples, illustrations, and diagrams are helpful. The author generally does a good job of balancing the need for sufficient detail to understand the concepts without "cluttering" with excessive detail.

The author accomplishes his objectives and does it in an interesting, readable fashion. Anyone teaching a tax course for non-specialist tax students should seriously consider using the book.

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RAY M. SOMMERFELD, HERSHEL M. ANDERSON, and HORACE R. BROCK, *An Introduction to Taxation*, 1978 Edition (New York: Harcourt Brace Jovanovich. Inc., 1977, pp. xviii, not paginated, $16.95).

The 1978 edition of this book follows the same general outline as the 1977 edition and the same general teaching philosophy. It has been updated for the 1977 Tax Reduction and Simplification Act. Therefore, it can be adopted for the Fall 1978 semester without concern about obtaining supplements to cover the latest changes.

With many schools revising their accounting and tax offerings, it seems like an appropriate time to review the advantages and disadvantages of this text. One of the major advantages is that the book is well written and easy to read. By adopting the "prose" style rather than the "reference" style, the students will find it easier to understand the points that the authors are making and will not find the reading as tedious as some other texts.

Another advantage is the inclusion of the history of the various tax provisions as well as the reasons for their inclusion the law. If a student can understand why a specific provision is in the Code, he or she should be better able to remember it.

The direct quotation of many Code sections and the use of actual tax forms is another advantage. The use of the actual Code sections permits the students to see and get used to the actual language of the Code. The use of the tax forms shows how the theory is translated into actual practice. These two items should make this text more acceptable to a teacher who has been using a "reference" style text for the detail but is not completely satisfied with it.

In addition to covering the taxation of individuals, the text covers corporations, income taxation of estates and trusts as well as estate and gift taxation. This makes the text ideal for a one-semester course which is intended as an overview. It can, however, be used by schools which want to concentrate on individual taxation in the first semester by omitting specific chapters and sections.

The authors have included a large number of problems in the text along with several return problems. The return problems gives the student the opportunity to fill in the tax forms. The actual experience with the tax forms should provide the students first-hand experience with the compliance aspects of the law.

The major disadvantage to this text is the lack of detail concerning most Code sections. For those who like to delve deeply into the law and interpretation, the text must be supplemented either with handbooks or with the Code and regulations themselves. This is not a completely satisfactory solution, since it involves some duplication of material as well as requiring the students to master two completely different styles of presentation.

Schools that cover the field of taxation in a two-semester sequence may have trouble using this text. It is difficult to isolate the material just on individuals or just on corporations and partnerships. In addition, there may not be enough material on corporations, partnerships, estates, trusts and gifts to cover a whole semester. In that case, a different text would have to be adopted for the second course.

Another item that the text does not cover is research. Chapter 28 does provide an overview of the legislative and judicial process. However, to teach the students how to do tax research would require supplemental material. This could be accomplished by requiring the students to purchase a separate text on tax research. This would still leave the problem of coordinating the integration of tax research with the learning of the tax rules.

On balance, the text has many advantages which makes it an excellent choice for the first tax course.

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NESTER E. TERLECKYJ, *Improvements in the Quality of Life: Estimates of Possibilities in the United States, 1974-1983* Washington, D.C.: National Planning Association, 1975).

This book "represents an attempt to devise an analytical framework for systematically assessing existing possibilities for social change measured by a set of quantitative indicators" (p. g) and presumably is the culmination of the author's earlier studies on social measurement and social indicators (or "goal output indicators"). The author limits the analysis to "social concerns" that, in his viewpoint, "command a high degree of consensus as to the desirability of change in a given direction, as revealed by the behavior of individuals and of political bodies at national and local levels."

Along another dimension, the author identifies 28 discretionary activities which "constitute a summary of the technically feasible possibilities for improving, over a 10-year period, specific aspects of the quality of life in the United States." These 28 "discretionary activities" are, then depicted as rows of a large matrix, and the 22 "goal output indicators" are shown depicted as matrix columns. Cells of this matrix are the author's best forecasts of the effects of the discretionary activities on goal output indicators, 1974-83. In other words, this is a short-range futuristic scenario on the extent to which a given activity contributes to all 22 goal output indicators simultaneously. Effects of multiple activities on goals, however, are not considered to be additive, *i.e.*, due to complex interactions, the combined effects are usually less than the sum of individual effects. A linear programming approach was developed to estimate the non-additive effects. Another matrix, an activity-cost matrix, gives the total activities costs broken down into public and private outlays.

Much of the book is devoted to the tremendous "grasping at straws" efforts required in estimation of resource availabilities and relationships between activities and goals. This book may be of particular interest to future economic and social planning, although the author asserts that "the discretionary activities defined here are not recommendations for government programs or for general social adoption."

Both the magnitude of problems undertaken by the author and the need for a great many assumptions and crude approximations can be appreciated. However, there are so many limitations in this Herculean endeavor that one wonders if it is worth such an effort. Several of the more disturbing aspects of the author's model are:

(1) The deterministic nature of the model coupled with the tremendous impact which numerous contingencies have on both the estimates and projections. For example, many if not all the projections can be greatly influenced by revolutions in major resource centers (notably Africa and South America), war in the Middle East, major oil discoveries, world recession, *etc*. Futuristic scenerios which account for major contingencies in a probabilistic manner would be of greater use in social planning and decision making. For instance if the model incorporated cross-impact analysis forecasts based upon probabilistic contingency linkages of experts, it would be more impressive.

(2) The goal output indicators are too limited, *e.g.*, the author states that an "attempt was made to include the areas of freedom, justice, and social harmony, but the data

have not been sufficiently developed to permit a "quantitative approach." (p. 15). But if the "quantitative approach" forces these and many other social concerns out of the analysis, perhaps the analysis should be broadened to allow for more qualitative concerns rather than to eliminate all non-quantifiable concerns.

(3) Perhaps the "social concerns" (as represented by goal output indicators) and estimated relationships with "discretionary activities" will be greatly affected by changed social priorities not considered by the author. For example, the "taxpayer revolt" in the 1978 California election regarding greatly reduced taxes seems to have caught many social planners and government off guard. *The Wall Street Journal* (May 25, 1978) notes the tremendous population growth rate in New Hampshire due, in large part, to priorities placed by individuals and business firms on fewer social services and lower taxes (New Hampshire has neither an income nor a sales tax). The point here is that the author's model and choice of social concerns and goal indicators "are based on precedent and current emphasis, especially as revealed by amounts spent from personal and public resources for activities bearing on these concerns (p. 19)." New Hampshire Governor Thomson says, "New Hampshire is what America was." The more recent precedent and Terleckyj's emphasis on the 1960s and 1970s may be misleading relative to more recent attitude shifts amidst soaring inflation and taxpayer sentiment. The past, in this case, leads the author to some rather shaky projections not accompanied with probabilistic accounts of substantial shifts in social priorities.

The analytical system developed by the author is too limited by both exclusion of too many important social concerns (albeit many which cannot be quantified at present) and failure to link contingencies in probabilistic networks, but it may serve as a foundation on which to build a more useful analytical system.

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RUSSELL W. WILLEY, *Foreign Exchange: The Accounting Economics and Control* (Wilmington, Delaware: Nopoly Press, Inc., 1977, pp. 390, $21.75).

Many of the current problems in foreign exchange are reviewed by quoting various other writers and then stating the view of the author. Since a great many areas are covered, there is not a great deal of depth on some subjects. The book has a novel approach to recording non-local currency on the local companies' books. The author uses some new terminology, so the reader must think about how the new terminology differs from commonly used terminology.

The first four chapters cover foreign currency conversion and translation. Always difficult to comprehend, this material could have been placed in later chapters and with more narrative, would have been more understandable. An example has a difference between the gain or loss account in the trial balance and that in the formal income statement. Although this is mentioned and reconciled, the reader spends too much time on the reconciliation and too little on the concepts. The author's way of keeping a dual set of records, one in the local currency and one in the foreign currency, is a very helpful approach when it comes to reconciling intercompany accounts and showing the foreign activity that has taken place.

The second four chapters consider foreign exchange "gains or losses." The terms "unrealized gains" and "secondary translations" are introduced, but the terms are not defined until later. One and two transaction theory, and realized and unrealized gains, are difficult to explain. Many of the examples are complex, making understanding more difficult for a novice. The national governments' role in the movement of funds is considered. There is a brief discussion on tariffs in general and GAAT (General Agreement on Tariffs and Trade) in particular. Export credits and other financing assistances as well as import quotas are reviewed with why governments impose multiple exchange rates and how business can react to multiple rates.

There is a rather complete discussion on the fluctuation of exchange rates and the importance of inflation in the movement of currency exchange rates, the problems of calculating and recording realized and unrealized gains and losses, and the history of foreign exchange translation. The latter would have been excellent opening subject matter to provide the novice reader an historical perspective.

After inflation accounting and its impact on translation accounting is discussed, the author considers whether to translate and then adjust for inflation factors, or adjust for inflation factors and then translate. His conclusion is to adjust for inflation first, using price-level or current value.

and then translate the financial statements. The author also covers in what currency should the company have an exposure; estimating the gain or loss that will result from a revaluation or devaluation; methods used to reduce or avoid exchange risks; the controlling and administering of exchange exposure; and budgeting and evaluating foreign operations. In this section, one of the better ones, the author demonstrates a vast amount of knowledge in these areas and his examples and narrative are quite thorough.

After discussing FASB Statement No. 8 regarding the recommended treatment of foreign exchange gains or losses on the financial statements, there is a discussion of the difference between an economic and an accounting gain or loss. Many corporations may protect themselves from an accounting loss, the author points out, when no economic loss has occurred. The book concludes with a theoretical discussion of hedging and a summary.

According to the preface, the book was written both for those with little knowledge of foreign exchange and for those with a sophisticated knowledge. This is a difficult task. The result is that some examples are in depth, such as foreign exposure and management control, but there is not any discussion of fixed assets when considering translation. Where the author's analysis is superficial, an excellent bibliography is provided. Everyone will find some parts of the book not to their liking; however, most will also find something new and interesting.

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Professional Firm Publications

JAMES H. SCHEINER, *University of Tennessee*

This is the second of a new series designed to highlight accounting firms' publications of possible interest to academics. In recent years the largest public accounting firms have increased the quantity and quality of their accounting publications. Single copies are usually available upon request from the nearest office.

Accounting for Sales of Real Estate, published by Price Waterhouse & Co., discusses in an organized manner accounting for real estate transactions including land sales.

An Analysis of the Foreign Corrupt Practices Act of 1977, published by Arthur Andersen & Co., considers in separate sections the antibribery and accounting standards provisions of this act. In each section, the important points of the act are highlighted, an "Analysis and Comment" is provided in a question and answer format and unanswered questions are included as "Points to Ponder." The text of the act including the conference committee statement is reprinted in this volume.

Building the Decision Base for Acquisition, by Adrian R. Stanway of Coopers & Lybrand, provides insights into information desired by management and by accountants in acquisition situations. A checklist covering company background, management and personnel, production and purchasing, marketing and sales, accounting records, operating results, balance sheet review and forecasts is provided.

Executive Prerequisites: Illustrative Disclosures from Recent Proxy Statements, published by Deloitte Haskins and Sells, presents examples from the *Fortune* Directories of management remuneration disclosures in compliance with SEC requirements. The relevant SEC releases are included in an appendix.

Ernst & Ernst GAAP-Stock Life Companies is a sourcebook for those interested in the accounting and reporting requirements of stock life insurance companies. The first part of the book provides background on the industry and the industry audit guide. The next two parts examine benefits and costs. The fourth section considers other types of business segments which might be a part of stock life insurance companies including health and group insurance. The fifth section examines special industry problems including deferred premiums and general financial reporting requirements including business combinations.

Financial Disclosure Practices of the American Cities II, by James Hogan and Anthony Mottola of Coopers & Lybrand, is a continuation of the 1976 monograph. In this monograph, the authors present their recommendations for municipal financial disclosure. The recommendations are developed by considering four basic issues: user classification, users' needs, the reporting entity and report presentation. The authors indicate that their recommendations are based upon the results of questionnaires sent to various interest groups and a symposium attended by government, nonprofit, urban-oriented agency and civic organization officials.

Ernst & Ernst has published *Financial Reporting Trends* for banks, fire and casualty insurance companies, life insurance companies, and savings and loan associations as surveys of the reporting practices in these industries. In general, each volume considers recent accounting pronouncements, annual report, financial statement and form 10-K information. Typically, summary tables and narratives as well as examples illustrating representative or unusual reporting are presented.

Municipal Accounting and Reporting: Issues for Research, published by Alexander Grant & Company, presents the consensus of a conference held in late 1976 at the University of Texas to examine "key issues" of 1) information requirements of investors and other users of municipal financial statements, 2) fund accounting, 3) auditing, and 4) regulation of municipal reporting. The editor, Michael Granof, indicates that the book presents the consensus of the views of 60 authorities in municipal financial matters about important research topics.

Professional Responsibilities in a Time of Change, published as a special edition of *The Arthur Young Journal*, presents one firm's responses to "The Accounting Establishment." Chapters examine the current situation, possible alternatives and their implications on the auditor's report, his independence and legal liability, the structure, and regulation of the profession. The final chapter presents the firm's response to allegations made against it.

The Audit Committee of the Board of Directors, published by Arthur Andersen & Co., discusses the current trend toward the establishment and use of audit committees. The position of policy making bodies on audit committees is reviewed. The possible composition, structure and function of an audit committee are considered.

Capsule Commentaries

THOMAS J. BURNS, *Editor*

Commentaries in this issue are by the Book Review Editor.

ALFRED D. CHANDLER, JR., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1977, pp. xvi, 608, $18.50).

This prize-winning history explains the evolution of the structure of large enterprises, the rise of a new class of managers and the multiunit firm. Chandler argues that technological change and major shifts in demand have exerted a far greater influence in determining size and concentration in American industry than the quality of entrepreneurship, the availability of capital, or public policy. Recommended particularly to managerial accountants.

Committee Reports Volume 1978-3, Committee on Accounting Library (Sarasota, Florida: American Accounting Association, 1978, Single Copies free on request).

Accounting Library Lists prepared in 1977 "to assist the faculty and librarians of small schools and colleges in planning and building their libraries of accounting publications." Four lists are provided: professional accounting organizations, other publishers of accounting literature, periodicals in accounting, and a categorized sample of accounting publications. Recommended to libraries, accounting departments, public accounting firms, and academics, especially new assistant professors. Lists are informative and the sample of accounting books listed is contemporary and includes references to their reviews in THE ACCOUNTING REVIEW.

DICK FRANCIS, *Risk* (New York: Harper & Row, Publishers, Inc., 1977, p. 240, $8.95).

In this unusual book, a professional accountant (and jockey) is the hero. A best-selling work of crime fiction, it is the eighteenth such book about horse racing by a former English jockey who seems to have succeded Dame Agatha Christie. Dedicated to the memory of Lionel Wick, who was both a certified accountant and a professional steeplechase jockey, the author has succeeded not only in writing an exciting novel but also in conveying how an auditor detects fraud.

ERNEST B. HORWATH, LOUIS TOTH, Revised by JOHN D. LESURE, *Hotel Accounting*, Fourth Edition (New York: John Wiley & Sons, 1978, pp. v, 424, $16.00).

This new edition of a book first published in 1928 is particularly suited to hotel personnel who may have only a limited knowledge of accounting. Based on actual practices, it gives special attention to problems associated with internal control, budgeting, payroll, sales-and-leaseback transactions, syndicated ownership, guest referral groups, and credit card sales.

CHARLES E. LINDBLOM, *Politics and Markets: The World's Political-Economic Systems* (New York: Basic Books, Inc., 1977, pp. xi, 403, $15.00).

A controversial book by the Yale University Sterling Professor of Economics and Political Science who argues that: (1) business and government share power similar to the way church and state divided authority in medieval Europe; (2) business must be induced by means of special privileges to perform its market system tasks, and these privileges give a degree of influence over the political process that no other interest group can begin to match, and (3) that the rigid separation of political and economic analysis in this country has been harmful. The book does not adequately recognize the pluralism of the American political process (including the accounting profession), but accountants seeking to understand the Metcalf-Moss-*et al.* Committees should read the book.

HAROLD F. RUSSELL, *Foozles & Frauds* (Altamonte Springs, Florida: The Institute of Internal Auditors, Inc., 1977, pp. xv, 249).

With a foreword by Victor Z. Brink, this book is an attempt to put fraud into perspective for the internal auditor. It is divided into eight parts: elements of fraud (10 pages), audit program (60 pages), the investigative audit (30 pages), fraud and the criminal law (30 pages), suggested audit recommendations (22 pages), conclusions (8 pages), historical aspects and case readings (84 pages), and checklist (7 pages). Lively, even breezy.

THOMAS WHITESIDE, *Computer Capers: Tales of Electronic Thievery, Embezzlement, and Fraud* (New York: Thomas Y. Crowell Company, 1978, pp. 164, $7.95).

Recommended by John K. Galbraith to thieves and accountants. A journalistic and witty account of prominent computer crimes such as Equity Funding and Union Dime.

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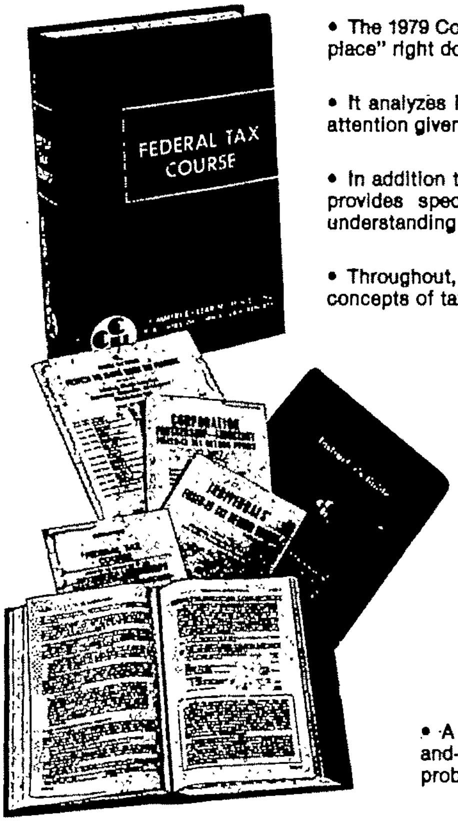

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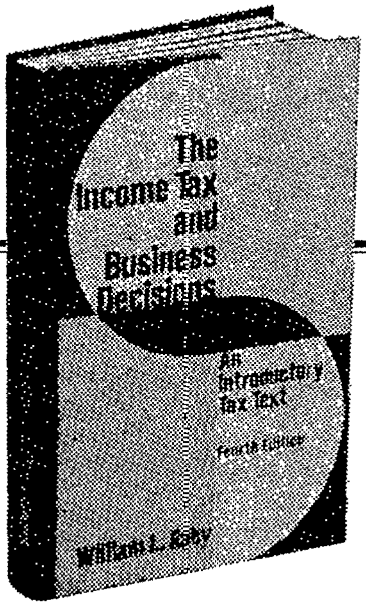

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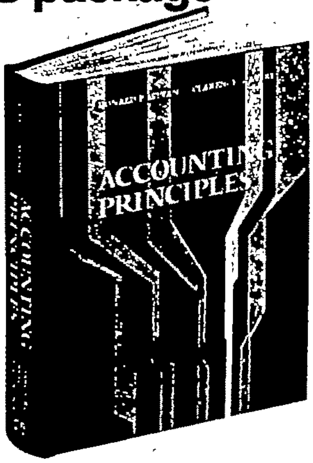

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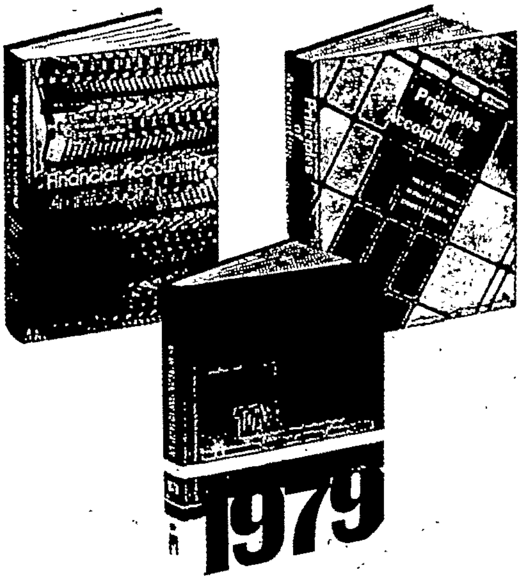

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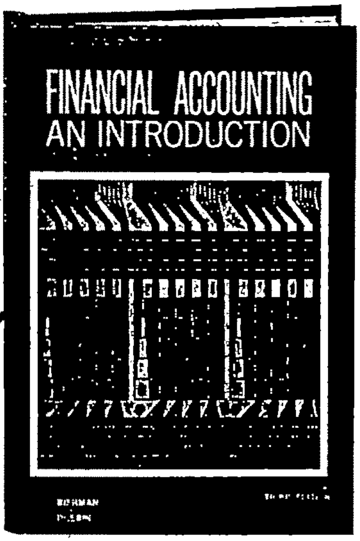

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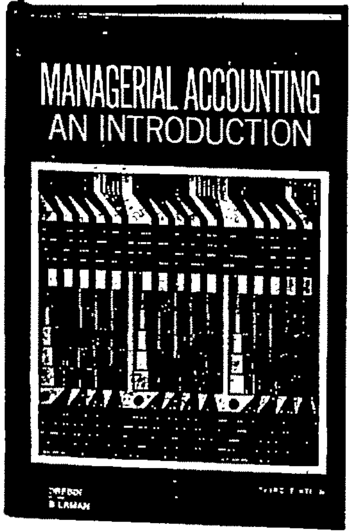

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#121 THE UNIVERSITY OF MASSACHUSETTS/AMHERST invites applications for the position of CHAIRPERSON, DEPARTMENT OF ACCOUNTING. Candidates should have efficient administrative skills, demonstrated competence in accounting research, a record of effective teaching, and earned a Ph.D. or D.B.A. with a concentration in accounting. CPA or CMA designations are desirable but not essential. The School of Business Administration has AACSB accreditation at both the undergraduate and graduate levels. The Department of Accounting and The School of Business offer BBA, MSBA, MBA, and Ph.D. degrees. The Chairperson must have the capability to furnish positive leadership, and continue to build and develop a strong accounting faculty. Salary and rank are competitive and dependent upon credentials. Send resumes to Professor Joseph L. Sardinas, Jr., Chairperson, Search Committee, Department of Accounting/SBA, University of Massachusetts, Amherst, MA 01003. The University of Massachusetts is an Affirmative Action/Equal Opportunity Employer.

#122 Canisius College, Buffalo, New York, has a faculty opening for 1978–79. Salary highly competitive. Rank—Assistant Professor to Professor depending upon qualifications. College offers undergraduate degree in Accounting, and MBA with emphasis in Accounting. The undergraduate program is fully accredited by the AACSB. Liberal fringe benefits including sabbatical. Ph.D. or DBA preferred, but candidates in final stages of dissertation will be considered. Contact Dr. Daniel E. O'Keefe, Chairman, Department of Accounting, Canisius College, 2001 Main Street, Buffalo, New York 14208, Phone (716) 883-7000, ext. 740.

#123 Accounting faculty positions. Tenure track; all specialties available. Doctorate in accounting or ABD (advanced stages) preferred; CPA or CMA and prior teaching and/or business experience desirable. Target level for most openings: Instructor or Assistant Professor. Rank and salary competitive on basis of qualifications; excellent benefits. Nine hour load per semester for assistant professor or higher ranks; research and/or consulting opportunities available. Send credentials to: David F. Fetyko, Chairman, Department of Accounting, Central Michigan University, Mt. Pleasant, MI 48859. Women and minority persons are encouraged to apply; CMU is an Equal Opportunity/Affirmative Action employer.

#124 ACCOUNTING; Louisiana State University, Department of Accounting, anticipates faculty openings for the Fall of 1979. While these openings are primarily at the assistant professor rank, applications at other ranks will also be considered. Candidates should have a doctorate or be near completion of their doctoral program. Faculty are expected to teach 9 hours per semester and be actively involved in research and professional service. The University is an Equal Opportunity Affirmative Action employer. Please send resumes and references to: Vincent C. Brenner, Chairman. Department of Accounting, College of Business Administration, Louisiana State University, Baton Rouge, LA 70803.

#125 Faculty Positions/Accounting—Bentley College in Waltham, Mass. has Faculty Positions in Accounting open for June or September 1979. Earned doctorate preferred but will consider ABD's and MBA/CPA's. Appointment rank and salary highly competitive—dependent on education and teaching and/or business experience. Opportunity to teach at graduate level (300 students enrolled) as well as undergraduate level (4600 students enrolled). Exciting challenge of participating in the growth of professional disciplines which are emphasized at a school long-known for its leadership in accounting education. Modern, attractive, functional campus offering residential, recreational and cultural advantages of suburban Boston area. Submit resume and references to: Dr. John H. Burns, Dean of the Undergraduate College, Bentley College, Beaver & Forest Streets, Waltham, MA 02154. Equal Opportunity/Affirmative Action Employer.

#126 POSITION VACANCIES—*Chairperson/Assistant Dean, Business Careers:* Manage department concerned with career development of hearing-impaired students enrolled in business programs at the National Technical Institute for the Deaf. Ph.D. in Business or Education plus three years college teaching. *Accounting Faculty:* Teach introductory and intermediate accounting courses. Bachelor's in Accounting or Business Education plus relevant industrial experience. Send resumes: Personnel Coordinator, Box AR19, National Technical Institute for the Deaf, Rochester Institute of Technology, 1 Lomb Memorial Drive, Rochester, New York 14623. NTID at RIT is AA/EOE.

#127 Faculty position—August 1979 opening for a good teacher of undergraduate accounting courses. Prefer Doctorate but will consider MBA/CPA. Send resume to Dr. Lawrence Weiser, Chairman, Department of Economics and Business Administration, University of Wisconsin—Stevens Point, Stevens Point, WI 54481.

#128 COLLEGE OF THE HOLY CROSS, an undergraduate liberal arts institution, is likely to have a tenure track faculty position in Accounting available beginning in Fall 1979. Appointments will be considered at any rank. Ph.D. or D.B.A. in Accounting or proximate completion required, Salary is competitive and determined by experience and achievement. Nine hours of undergraduate teaching at both the elementary and advanced levels. Some emphasis on research. Send resume, three letters of reference, and graduate transcript to John F. O'Connell, Chairman, Department of Economics, College of the Holy Cross, Worcester, MA 01610. An Equal Opportunity/Affirmative Action Employer.

#129 Faculty positions open in Accounting at ranks of assistant professor and instructor. Rank and salary competitive and dependent on qualifications and experience. Doctorate required for advanced rank, masters for instructorship. AACSB accredited at both undergraduate and graduate levels. Enrollments of 1800 undergraduates and over 500 in MBA program. M.S. in Accounting beginning in 1979. Business faculty of forty full-time staff in university of 11,000 students. City of 54,000 in center of major industrial and recreational region of Wisconsin. Contact Dr. Clifford E. Larson, Dean, College of Business Administration, University of Wisconsin—Oshkosh, Oshkosh, Wisconsin 54901. An Affirmative action/equal opportunity employer.

#130 *University of Maryland* (College Park)—has openings for accounting faculty at Assistant, Associate, and Full Professor levels. Minimum qualification for Assistant Professor is a D.B.A. or Ph.D. A candidate for Associate Professor should have a strong record in research and teaching. A candidate for Full Professor should have an established record as a productive scholar and an excellent teacher. Interested candidates should send resumes to Professor Stephen E. Loeb, College of Business and Management, University of Maryland, College Park, Maryland 20742. An Equal Opportunity/Affirmative Action Employer.

#131 J.D., CPA, M.A., administrative and/or teaching tax, business law, NFP and/or other accounting subjects. Over 15 years of full-time teaching, business and governmental experience. Publications and university service.

#132 UCLA has a vacancy for a person at the associate or full professor level, with tenure, effective Fall 1979. Applicants must have a doctoral degree (a CPA is desirable), and a proven record in research and teaching. An emphasis in financial accounting and empirical research capability is desired. Salary competitive. Send resume to: Paul D. Baker, Department of Accounting and Finance, West Georgia College, Carrollton, GA 30118. WGC is an AR/EO employer.

#133 West Georgia College has one or more positions in the Department of Accounting and Finance available Fall, 1979. Rank to be Assistant or Associate Professor. Ph.D. preferred, but will consider ABD near completion of dissertation. Primary teaching areas include financial cost, and managerial accounting. A candidate qualified to teach corporate finance occasionally is highly desirable. Salary competitive. Send resume to: Paul D. Baker, Department of Accounting and Finance, West Georgia College, Carrollton, GA 30118. WSG is an AA/EO employer.

#134 UNIVERSITY OF TEXAS AT ARLINGTON, invites applications for assistant professor of accounting for Fall, 1979 with doctorate in accounting. Will consider ABD candidate where evidence shows probable early completion of dissertation. Professional certification and experience (business and teaching) are desirable. Full time and part time temporary instructorships requiring master's degree (concentration in accounting) and CMA or CPA are often available (sometimes on short notice) and openings are expected for Fall, 1979. For either regular or temporary positions, please send letter of interest and resume to D. J. Casler, Chairman, Department of Accounting, University of Texas at Arlington, Arlington, Texas 76019. The University is an Equal Opportunities/Affirmative Action employer.

#135 ACCOUNTING POSITIONS AT PACE UNIVERSITY, NEW YORK CITY—Two full-time positions available September, 1979. Qualifications: Ph.D. or ABD plus CPA or CMA preferred, Masters Degree plus CPA or CMA minimum requirement; significant professional experience. Tenure track will require attainment of terminal degree. Rank and salary commensurate with qualifications. Send resume to: Chairman, Department of Accounting and Finance, The Lubin School of Business Administration, Pace University, Pace Plaza, New York, New York 10038.

#136 ACCOUNTING POSITIONS. The School of Business and Public Administration at the University of the Pacific, Stockton, California, has two tenure track positions available for Fall, 1979. teaching undergraduate courses in Accounting. Preference given to Ph.D.'s or D.B.A's. Minimum acceptable qualifications are M.B.A./C.P.A. Assistant Professor preferable, but will consider qualified candidates for rank of Associate. Salary competitive with market and dependent upon qualifications, experience, and rank. Equal Opportunity/Affirmative Action Employer. Please send letters of application and copy of vita to Professor Sue Hinrichs, School of Business and Public Administration, University of the Pacific, Stockton, CA 95211.

#137 FACULTY POSITION—Assistant/Associate Professor in accounting, beginning in August, 1979, at Millikin University, an academic community in the heart of Illinois of 1,500 students and 100 faculty that stresses small class sizes and values teaching experience. Ph.D. or Masters with CPA/CMA and public/private accounting experience. Competitive salary and very attractive fringe benefits. EOE/AA employer. Contact Nicholas A. Kargas, Chairman, Department of Accounting, School of Business and Industrial Management, Millikin University, Decatur, Illinois 62522.

#138 BS (Accounting), JD, LLM (Taxation), SJD; CPA; Member of Bar; formerly professor, tax consultant, attorney USA; resident in Europe disposed to relocate; experience in Europe management, administration, finance, accounting, tax, auditing USA subsidiaries, Big 8 firms; professorial assignments in Europe undergraduate, graduate business programs, courses Financial/Managerial Accounting, International Accounting, Financial Management, International Financial Management, Business Principles, International Business, International Management, International Marketing; courses in preparation International Taxation, Legal Aspects of Multinational Operations, Auditing; seeks affiliation with University having a Business Studies program with internationally oriented offerings. Postbus 254, 1000 Brussels 1, Belgium.

#139 University of Southern California, Department of Accounting, is seeking candidates for faculty positions leading to tenure with a primary interest in accounting or taxation. Faculty positions above the assistant rank are also possible for individuals with a strong teaching and publication record. Candidates for assistant professor should have a doctorate in hand or be near completion of the dissertation, strong teaching ability and interest in research. The University of Southern California is an equal opportunity affirmative action employer. Applications are encouraged from women and minority persons. Please contact Professor Doyle Z. Williams, Chairman, Department of Accounting, Graduate School of Business Administration, University of Southern California, Los Angeles, California 90007.

#140 CHAIRPERSON, DEPARTMENT OF ACCOUNTING AND DATA PROCESSING, Boise State University, July 1, 1979. Boise State has approximately 10,000 students. The School of Business is currently seeking AACSB accreditation at the undergraduate level. Within the School, the Department of Accounting and Data Processing (615 majors) offers the baccalaureate and Master of Science in Accounting degrees. The Department Chairperson must have the ability to provide positive leadership in continuing to build and develop a strong faculty and provide graduates with the necessary tools of a professional in Accounting and/or Data Processing. Applicants must have a doctorate in Accounting or Data Processing. Requirements also include efficient administrative skills, a record of effective teaching, demonstrated research ability, and the capability and desire to work effectively with business and professional organizations to raise outside support. CPA, CMA, or other professional designations are desirable. Salary dependent on available funding. Contact Dr. Alistair R. MacMillan, Acting Chairman, Department of Accounting and Data Processing, School of Business, Boise State University, Boise, ID 83725. An Equal Opportunity Employer/Educator.

#141 M.B.A., Ph.D., C.P.A. experienced in small businesses, public accounting, and teaching, some publication, presently tenured full professor at AACSB university wishes to relocate September, 1979.

#142 Upstate New York College, with strong, registered accounting program, has opening for assistant professor (or possibly associate) beginning in September, 1979. Minimum requirements: CPA and master's degree. Candidates with background in public practice preferred. Send complete resume to Professor R. J. DuPlessis, St. John Fisher College, Rochester, NY 14618. An equal opportunity employer.

#143 Bryant College is seeking a generalist with strengths in advanced, cost, and non-profit accounting. Training in finance may also be helpful. We prefer the Ph.D. or D.B.A. but will consider a strong teaching candidate with the M.B.A. and/or C.P.A. willing to pursue an accredited terminal degree. Appointment is anticipated for September 1979. Send credentials to Dean Stanley J. Kozikowski, Bryant College, Smithfield, RI 02917. An EO/AA Employer.

#144 Head, Department of Accounting. Beginning July 1, 1979. Kansas State University invites applicants and nominees as Head of new Department of Accounting. Program has about 600 undergraduate majors, 11 full time faculty; Master of Accountancy degree program has about 30 majors. Applicants must be senior faculty with doctorate in accounting, record of teaching excellence, substantial publications, active professional involvement and administrative skills. Salary is $33,000–$36,000 (12 months) depending on experience. Send resumes or nominations before February 10, 1979 to Dr. Kenneth L. Fox, Chairperson, Accounting Search Committee, College of Business Administration, Kansas State University, Manhattan, KS 66506. Kansas State University is an equal opportunity affirmative action employer.

#145 Simon Fraser University, attractively located in the Vancouver metropolitan area, with strong programs in economics and business at the B.A., M.A., M.B.A. and Ph.D. levels, invites applications for faculty positions in accounting/management information systems. Two tenure-track positions at assistant or associate professor levels, both to begin September 1, 1979, or otherwise by agreement. Ph.D. must be in hand or near completion. Preference to those eligible for employment in Canada at time of application. Salary negotiable; positions contingent on budgetary constraints. Send curriculum vitae and names of three referees to: Dr. Wm. C. Wedley, Associate Chairman, Department of Economics & Commerce, Simon Fraser University, Burnaby, B.C., Canada, V5A 1S6.

#146 UNIVERSITY OF DAYTON has faculty openings in the Department of Accounting beginning late August 1979. Salary and rank dependent upon experience and credentials. Prefer doctorates or ABD's; however, Masters with CPA or CMA are encouraged to apply. Teaching assignments are at both undergraduate and graduate level. Write: Chairman, Department of Accounting, University of Dayton, Dayton, Ohio 45469. Equal Opportunity/Affirmative Action Employer.

#147 RUTGERS UNIVERSITY, CAMDEN, NJ, has several openings in accounting and business law. Accounting positions involve teaching in the areas of financial accounting, taxation, and auditing. Candidates with an accounting doctorate and a reputable academic publication record will be considered at the associate professor level while candidates near completion of dissertation or MBA-CPA credentials will be considered at the instructor-assistant professor levels depending on other qualifications. Candidates for business law with J.D./MBA, J.D./CPA, or J.D./LL.M. credentials will be considered under comparable basis. Opportunities to teach at the graduate (MBA) and undergraduate levels are available in a department of 700 students, 17 faculty, offering majors in accounting and general business administration. Campus is about 5,000 students, close to Philadelphia. AAUP contract, salary scale A rated; teaching load five courses for two semesters. Rutgers is an equal opportunity employer. Send resume to Dr. Izzetin Kenis, Rutgers University, Camden Campus, Camden, NJ 08102.

#148 FACULTY POSITION, Graduate School of Business Administration, HARVARD UNIVERSITY, is currently searching for one or more Assistant Professors to fill positions to teach graduate financial and managerial accounting. The positions entail substantial case-method teaching at graduate and executive program levels and strong potential and interest in field-based case-course development and research on issues of significance to academics, management, and the accounting profession. Salaries are in the range of $20,000 to $24,000 for the academic year. The upper salary levels are for previous experience which has demonstrated high order of ability in case-method teaching, course development and research. The School encourages summer case-course and management-oriented research through its Division of Research and Course Development. Applicants should submit current vitae; full transcripts of undergraduate and graduate work; GMAT and/or GRE test scores (if available); a list of honors and awards received; copies of publications, current working papers, and cases written; description of courses taught, particularly those in which case-method teaching has been done; a statement of why he or she is specifically well qualified for the position; and a list of references. Send full package of requested materials to: Professor Neil Churchill, Harvard University Graduate School of Business Administration, Soldiers Field, Boston, MA 02163. Harvard University is an affirmative action equal opportunity employer.

#149 Ph.D., CPA, age mid-30's, currently assistant professor at a leading university. Teaching and research areas are systems, managerial accounting (including CASB pronouncements), and auditing (including auditing EDP systems). Excellent teaching evaluations. Active in the profession and in professional development activities. Seek position in an institution that was a balanced teaching, research, service/consulting emphasis. Available Fall of 1979.

#150 Ph.D., CPA, age 39, good research record, desires temporary summer teaching position at Southern, Southwestern, or Western School, available June–September 1979, teaching areas: Taxation, Auditing, Financial, Cost.

#151 C.P.A., MBA (recent), current associate professor at a Canadian university, seeking visiting or permanent faculty position in U.S. Primary area-financial and managerial accounting at all levels. Experience includes 12 years university teaching, 3 years public accounting (big eight) and 10 years industrial. Excellent teaching record and references. Available August 1979.

#152 J.D., L.L.M., (Taxation), MBA, CPA, with 12 years teaching experience and 6 years Big Eight accounting firm experience. Primary teaching emphasis has been in the areas of Federal Income Taxation, Intermediate Accounting, Advanced Accounting, and Auditing at the graduate and undergraduate level. Also have taught Business Law. Research and consulting in the areas of Local Government Accounting and Taxation. Interested in a school with a strong Taxation course offering at the graduate/undergraduate level or to assist in developing such a program.

#153 THE UNIVERSITY OF ALASKA AT FAIRBANKS is seeking qualified applicants at the rank of Assistant or Associate Professor (subject to final budget approval) to teach primarily Financial and/or Managerial Accounting and some Accounting Information Systems courses. Ph.D. or DBA is preferred. A.B.D.'s are encouraged to apply. Professional accounting experience is desired. The University emphasizes quality teaching and encourages research. This standard 12-unit load entails nine semester hours of teaching, and three in research. Salary is competitive. The University of Alaska at Fairbanks is an Affirmative Action/Equal Opportunity Employer. Contact: Professor M. A. Fink, Head, Accounting Department, School of Management, Fairbanks, Alaska 99701.

#154 William Jewell College is seeking a faculty member in Accounting to begin September, 1979. An excellent Christian liberal arts college located in a major metropolitan area, William Jewell maintains a selective and limited enrollment of 1400 students, 50 of whom are accounting majors. Rank and salary are open. Basic teaching assignment twelve hours. Candidates should be able to teach tax and cost accounting and consolidated statements. The ideal candidate should be willing to teach a range of accounting subject matters, be actively involved in personal and professional development, and share a commitment to the values of the College. Other desirable qualifications include teaching and business experience and the desire to work closely with students in job placement and student organizations. Candidates must possess a minimum of Masters degree and CPA certificate. Interested candidates are invited to submit their vitae to Dr. Otis Miller, Chairman, Department of Economics and Business, William Jewell College, Liberty, Missouri 64068.

#155 The McIntire School of Commerce of the University of Virginia announces openings in accounting at the Assistant Professor level for Fall, 1979. Candidates should have the Doctorate. Teaching and other professional experience in accounting are desirable. The School stresses teaching excellence and encourages and supports research and professional service activities. Send resume and two letters of reference to Dr. William K. Carter, McIntire School of Commerce, Monroe Hall, University of Virginia, Charlottesville, VA 22903. U. Va. is an affirmative action/equal opportunity employer.

#156 THE UNIVERSITY OF MISSOURI—ST. LOUIS invites applications for both permanent and visiting appointments in Accounting at all ranks to begin in September, 1979. Candidates with interests in the areas of financial accounting, accounting theory, auditing, or public sector accounting are preferred. Quality research and effective teaching are encouraged and rewarded and support facilities are excellent. Teaching loads are 9 hours per semester with two preparations. Established in 1963 in a pleasant, suburban site, UMSL has a rapidly growing business program accredited at both the undergraduate and master's level. Submit resume or inquiries to John J. Anderson, Coordinator, Area of Accounting, School of Business Administration, University of Missouri—St. Louis, St. Louis, Missouri 63121. UMSL is an affirmative action and equal opportunity employer.

#157 The University of Connecticut has two openings for faculty members to teach graduate and undergraduate accounting courses in Stamford and Danbury. Most of the teaching load will be in the MBA program with courses in the late afternoon and evening. Both Stamford and Danbury are two of the fastest growing business areas in the nation with headquarters of many Fortune 500 firms located there. The applicant should possess a doctoral degree with a concentration in accounting or have a reasonable expectation of completing the doctorate within one year. Professional certification as a C.P.A. or C.M.A. will be regarded as desirable additional qualifications. Rank and salary are open and dependent upon the qualifications of the applicant. The University is an Equal Opportunity/Affirmative Action employer. Please send resumes to Dr. Harold E. Wyman, Head Department of Accounting, U-41A, School of Business Administration, University of Connecticut, Storrs, CT 06268.

#158 FACULTY OPENINGS 1979–1980—Birzeit University, an independent Arab University in the Israeli-occupied West Bank of Jordan, has faculty openings for the academic year 79/80 in the following fields: ACCOUNTING; ECONOMICS; FINANCE; MANAGEMENT; and MARKETING. Experienced and interested persons with the Ph.D. are invited to apply. Applicants with the Masters degree are also considered. The University is a coeducational institution with an enrollment of about 1200 students. It is located in the town of Birzeit, 26 Kilometers northwest of Jerusalem. English is the language of instruction. Other particulars are attached. Address inquiries to the: Dean, Faculty of Commerce & Economics, Birzeit University, Birzeit, West Bank, via Israel.

#159 ACCOUNTING FACULTY: MICHIGAN TECHNOLOGICAL UNIVERSITY'S SCHOOL OF BUSINESS SEEKS FULL-TIME ACCOUNTING FACULTY FOR THREE POSITIONS AS FOLLOWS: 1.)Assistant/Associate Professor with Ph.D. in Accounting to teach accounting, CPA, CMA a plus. 2.) Assistant/Associate Professor with MBA/JD to teach Federal Income Taxes and other accounting courses, CPA a plus. 3.) Instructor/Assistant Professor with MBA/CPA to teach introductory and intermediate accounting. RANK AND SALARY DEPENDENT UPON ACADEMIC AND PROFESSIONAL EXPERIENCE. Michigan Technological University is located near the shores of Lake Superior in Michigan's Upper Peninsula. Michigan Technological University is an Equal Opportunity Educational Institution/Equal Opportunity Employer. Please send resume to Dr. Peter G. Biesiot, Dean, School of Business, Michigan Technological University, Houghton, Michigan 49931.

#160 ATLANTIC CANADA—Memorial University of Newfoundland, situated in the capital city of St. John's, invites applications for permanent appointments in accounting beginning in July or September 1979. Applicants with Ph.D. or D.B.A. are preferred but consideration will be given to M.B.A./C.A. with business experience. The School of Business Administration and Commerce currently has 600 students enrolled in its undergraduate co-operative education programme. A newly introduced M.B.A. programme has 35 full and part-time students. Teaching responsibilities would be in both areas. Faculty are encouraged and aided to conduct research, publish and further pursue their formal education. Forward Resume to: Dr. James G. Barnes, Director, School of Business Administration and Commerce, Memorial University of Newfoundland, St. John's, Newfoundland, Canada. A1B 3X5. (709) 753-1200.

#161 Assistant and Associate Professor of Accounting (one position). Require earned doctorate (CPA desired) with competence in auditing, financial, or managerial accounting and a strong preparation in quantitative methods (especially computer and electronic data processing systems). Commensurate with appointment level, require continuing relationships with accounting profession, excellent teaching and research/publication record, and prospect of continuing contributions. A nondiscriminatory, affirmative action employer. Please contact Chairman, Accounting Faculty, Graduate School of Business Administration, The University of Michigan, Ann Arbor, Michigan 48109.

#162 M.B.A.+with twenty-one graduate level semester hours in accounting is seeking a permanent teaching position at a two-year or four-year institution. Experience includes twelve years of university/college level teaching of accounting and related business and economics courses, two years as coordinator of accounting and business law, some public accounting, and advisor to student organizations. Member of American Accounting Association, National Association of Accountants, Beta Alpha Psi, and Omicron Delta Epsilon. Available Summer and/or Fall 1979.

#163 The University of Alaska-Anchorage anticipates a position in accounting for Fall, 1979. Applicants should possess or have nearly completed the doctorate with emphasis in accounting. Teaching opportunities include both undergraduate and graduate courses in financial and managerial accounting. Competitive salary and an excellent living environment are available. Both salary and rank are dependent upon qualifications and experience. Teaching is of primary importance, but research and public service are encouraged. This position should be especially attractive for a person desiring to work closely with the business community in a rapidly growing urban environment. For information, contact Dr. Garth Jones, Dean, School of Business and Public Administration, University of Alaska-Anchorage. University of Alaska is an Equal Opportunity Employer.

#164 WAYNE STATE UNIVERSITY is seeking faculty members in Accounting. Teaching opportunities within our undergraduate and MBA programs are available in all specialties. Earned doctorate and CPA or CMA are preferred, but ABD's will be considered. Salary and rank will be commensurate with qualifications and experience. These positions should be especially attractive to persons desiring to work with the business community because of the University's strategic location and close ties with firms in the metropolitan area. Wayne State University, a large, state-supported institution, is an equal opportunity/affirmative action employer. All qualified candidates are encouraged to apply. Please send vita to Professor A. C. Roberts, Chairman, Department of Accounting, 300 Prentis Hall, Wayne State University, Detroit, Michigan 48202.

#165 *FACULTY POSITION: ACCOUNTING*—Nazareth College of Rochester, a well-established independent college in Upstate New York is accepting applications for a faculty position in its growing Business/Economics/Management Department. Position is available in Fall 1979. The position's emphasis will be teaching rather than research. Successful candidates must have at least an MBA and post-secondary teaching experience. Preference will be given to those candidates with a CPA and/or a Ph.D. Salary is competitive and is commensurate with experience. Send resume and names of three references by 2/15/79 to: Mr. Leonard Maley, Chairman, Business/Management Department, Nazareth College, 4245 East Avenue, Rochester, New York 14610. An Equal Opportunity Employer.

#166 CALIFORNIA STATE COLLEGE, STANISLAUS needs Assistant/Associate Professors in Accounting, Information Systems, and Management, effective September, 1979. Excellent graduate and undergraduate program development opportunities. Teaching excellence stressed, scholarship and professional activity encouraged. Small classes, recently constructed facilities, spacious grounds. 4-1-4 calendar eliminates disadvantages of semester and quarter systems. No metropolitan congestion, two-hour drive to San Francisco/High Sierras. Earned doctorate preferred; candidates nearing completion seriously considered. CPA and/or CMA desirable for positions in Accounting. Affirmative Action/Equal Opportunity/Title IX employer. Please contact Professor Thomas P. Barrett, Division of Business Administration, California State College, Stanislaus, Turlock, CA 95380. (209) 633-2287.

#167 CALIFORNIA STATE UNIVERSITY, DOMINGUEZ HILLS (Los Angeles area) is seeking candidates for faculty positions leading to tenure, or full-time lecturers, in Accounting. The level of appointment and salary is dependent upon academic background, teaching experience, business experience and scholarship. An earned doctorate in Business Administration or Management, with specialization in Accounting, is required for tenure track appointment. Full-time lecturers should possess an M.B.A. and have either a CPA or CMA certificate, or strong indication that their doctorate will be obtained in the near future. Preference will be given for scholarly achievement evidenced by publication, significant experience in the field of business or public accounting, or at least three years full-time university teaching experience. California State University, Dominguez Hills is an Affirmative Action/Equal Opportunity/Title IX Employer. Applications are invited from all qualified persons of both sexes and all ethnic backgrounds, including handicapped individuals. Please send vitae and three letters of reference to Dr. Peter Herne, Chairperson, Accounting/Data Processing/Law, California State University, Dominquez Hills, 1000 East Victoria Street, Carson, CA 90747.

#168 HEAD, DEPARTMENT OF ACCOUNTING AND FINANCE, beginning July 1, 1979. The Faculty of Administrative Studies, The University of Manitoba invites applications for the position of Head of the Department of Accounting and Finance. The appointee will be responsible for the administration and coordination of teaching and research within the Department and for liaison with government, industry and professional organizations. The Department consists of 20 academic staff members who are active in teaching, research and professional activity. Salary will be commensurate with experience and qualifications. The closing date for applications is February 15, 1979. Applications, including a detailed resume and the names of three referees, should be addressed to Dr. Walter S. Good, Chairman of the Selection Committee, Faculty of Administrative Studies, The University of Manitoba, Winnipeg, Manitoba, Canada, R3T 2N2.

#169 FACULTY POSITIONS IN ACCOUNTING—Applications are being accepted for permanent accounting positions at Metropolitan State College, Denver, Colorado. Candidates should possess a D.B.A. or Ph.D., but applicants who are in the dissertation stage will be considered. Candidates must be committed to excellence in teaching. Salary and rank open, commensurate with qualifications and experience. Summer teaching available. Metropolitan State College is an Affirmative Action/Equal Opportunity Employer. Please write, with resumes, to: Dr. Patricia L. Duckworth, Chairperson, Department of Accounting and Financial Administration, Box 13, Metropolitan State College, 1006—11th Street, Denver, Colorado 80204.

#170 Whittier College is seeking applicants for two positions in accounting for Fall, 1979. Teaching emphasis is in financial and cost accounting for one position, in financial and auditing for the other. Preference will be given to those with doctorate, with entry at the Assistant Professor level. Individuals at ABD stage will be considered, as well as those qualifying for entry at Associate level. Whittier is a small private college located 20 miles east of Los Angeles. Excellence in teaching is the primary focus, and importance is also attached to the development of research and other professional interests. Enrollment is currently 280 students in the undergraduate business and M.B.A. programs. Faculty will number approximately 13 as of 1979–80. We offer salaries that are competitive. Please send applications with vita and references to: Dr. Phillip L. Beukema, Chairman, Department of Business Administration and Economics, Whittier College, Whittier, California 90608. Telephone (213) 693-0771, Ext. 240.

#171 One opening for Fall, 1979. A two or three-year renewable (tenure track) appointment. Rank, Assistant or Associate Professor. Ph.D. preferred, M.B.A.-C.P.A. required. Teaching load nine hours. Salary competitive, scholarly research and other normal professional responsibilities. Preference will be given to candidates with varied teaching experience and ability to share responsibility to initiate a new major degree in accounting to begin in 1980–81. Deadline: January 15, 1979. Send credentials to: David A. Martin, Chairperson, Department of Business and Economics, SUNY-Geneseo, Geneseo, NY 14454. An Affirmative Action/Equal Opportunity Employer.

#172 Accounting Faculty. Senior Professor. Ph.D. Desirable. Need individual to structure graduate accounting program. Computer facilities and consulting opportunities available. Close proximity to major urban areas. Lovely location. Write O. W. Nestor, Monmouth College, West Long Branch, New Jersey 07764.

#173 The State University of New York at Binghamton has two openings for Accounting faculty with interest in financial and/or management accounting. Rank is dependent upon qualifications. Salary and fringe benefits are competitive. Ph.D. candidates are encouraged to apply. SUNY-Binghamton is an equal opportunity/affirmative action employer. Send resume to Professor Bikki Jaggi, Chairman, Accounting Program, School of Management, SUNY-Binghamton, NY 13901. (Telephone 607-798-2674)

#174 The University of Illinois, Urbana, Illinois 61801 invites applications for permanent appointments in Accounting beginning Fall, 1979. Available positions are at all levels. Individuals with Ph.D. or D.B.A. required. Competitive salaries and working conditions. Qualified applicants are encouraged to apply. Please send vitae to Professor Norton M. Bedford, Department of Accountancy, University of Illinois, Urbana, Illinois 61801. The University of Illinois offers equal opportunity in its employment, admissions and educational activities, in compliance with Title IX and other civil rights laws.

#175 CALIFORNIA STATE UNIVERSITY, SACRAMENTO, has faculty openings in the Department of Accounting and Management Information Science beginning September 1979 in the Undergraduate and the Master programs; both are accredited by the AACSB. The openings are in the following two areas: 1) Accounting, and 2) Computer-based Information Systems. The faculty candidate will be expected to teach undergraduate and graduate level courses, to engage in instructional-related duties and other activities; more emphasis on teaching effectiveness. Salary and rank open, commesnsurate with academic preparation and professional experience. Appropriate doctorate (or near the final state of completion) required; professional certification (e.g. CPA) or progress towards such certification desirable. California State University, Sacramento is an Equal Opportunity Affirmative Action employer. Applications should include a curriculum vitae and names and addresses of three references. Applications should be addressed to: Dr. Donald H. Ford, Chair, Department of Accounting and Management Information Science, School of Business and Public Administration, California State University, Sacramento, 6000 J Street, Sacramento, California 95819.

#176 Department of Management, BUCKNELL UNIVERSITY, invites applications for an assistant/associate professorship in cost and managerial accounting. Rank and salary will be commensurate with experience and academic preparation. Ph.D./D.B.A. strongly preferred; industrial/managerial experience and CMA/CPA desirable. We seek candidates with records of successful course development and teaching accomplishments. The position entails primary responsibility for instruction in cost/managerial accounting and related courses at the undergraduate level, involvement with a small number of graduate students, and active participation in the development of mid-career professional education programs. Send vita, application letter, and list of references, to Dr. John Miller, Chairman, Department of Management, Bucknell University, Lewisburg, PA 17837. Bucknell is an Affirmative Action/Equal Opportunity Employer.

#177 Morgan State University invites applications for the position of Chairperson of the Department of Accounting and Finance. Candidate should possess a Ph.D. or D.B.A. with a concentration in accounting and or finance, effective teaching ability and administrative potential. Practical experience and the CPA or CFA designation are desirable but not too essential. The individual should be committed to maintaining a strong upper-level undergraduate and master programs. Salary is competitive and the rank is open. Send resumes and inquiries to Professor D. Nichols, Department of Accounting and Finance, Morgan State University, Coldspring Lane & Hillen Road, Baltimore, MD 21239. Deadline for application is January 31, 1979. The University is an Equal Opportunity/Affirmative Action Employer.

#178 Opening for a faculty position in accounting effective September 1, 1979 at Rider College, a private 4-year college located between New York and Philadelphia on a new suburban campus. The Accounting Department which enjoys a fine reputation is the largest in the College with twelve full-time faculty members. Emphasis is on teaching, but research and writing are encouraged. Doctoral degree or in dissertation stage required. Teaching opportunities available at the graduate and undergraduate levels. Rank and salary commensurate with qualifications. Salary is very competitive. Vita should be sent to Dr. William Mister, Chairman, Department of Accounting, Rider College, Box 6400, Lawrenceville, New Jersey 08648. An equal opportunity, Affirmative Action M/F Employer.

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For Academic Year 1979-80

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4. Submission of a complete set of application forms.

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2. The deadline for receipt of all application materials is February 15, 1979.
3. Requests for application forms should be addressed to:

Mr. Paul L. Gerhardt, Administrative Secretary
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5717 Bessie Drive
Sarasota, Florida 33583

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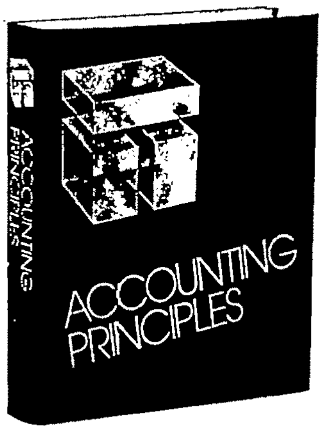

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APRIL 1979

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The American Accounting Association was founded in 1916 as the American Association of University Instructors in Accounting. Its present name was adopted in 1936. The Association is a voluntary organization of persons interested in accounting education and research. Full membership entitles one to receive *The Accounting Review* and *Accounting Education News* and to purchase Association publications at a discount. Associate members, limited to full-time students enrolled in institutions of higher education, receive *The Accounting Review*.

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The Demand for and Supply of Accounting Theories: The Market for Excuses

Ross L. Watts and Jerold L. Zimmerman

ABSTRACT: This paper addresses the questions of why accounting theories are predominantly normative and why no single theory is generally accepted. Accounting theories are analyzed as economic goods, produced in response to the demand for theories. The nature of the demand is examined, first in an unregulated, then in a regulated economy.

Government regulation creates incentives for individuals to lobby on proposed accounting procedures, and accounting theories are useful justifications in the political lobbying. Further, government intervention produces a demand for a variety of theories, because each group affected by an accounting change demands a theory that supports its position. The diversity of positions prevents general agreement on a theory of accounting, and accounting theories are normative because they are used as excuses for political action (*i.e.,* the political process creates a demand for theories which prescribe, rather than describe, the world).

The implications of the authors' theory for the changes in the accounting literature as a result of major changes in the institutional environment are compared with observed phenomena.

I. Introduction

The literature we commonly call financial accounting theory is predominantly prescriptive.[1] Most writers are concerned with what the contents of published financial statements should be; that is, how firms should account. Yet, it is generally concluded that financial accounting theory has had little substantive, direct impact on accounting practice or policy

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[1] For example, see Canning [1929], Paton [1922], Edwards and Bell [1961], Sprouse and Moonitz [1962], Gordon [1964], Chambers [1966], and American Accounting Association [1966]. We would prefer to reserve the term "theory" for principles advanced to explain a set of phenomena, in particular for sets of hypotheses which have been confirmed. However, such a definition of theory would exclude much of the prescriptive literature and generate a semantic debate. To avoid that consequence, in this paper (unless qualified) we use the word "theory" as a generic term for the existing accounting literature.

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formulation despite half a century of research. Often the lack of impact is attributed to basic methodological weaknesses in the research. Or, the prescriptions offered are based on explicit or implicit objectives which frequently differ among writers.[2] Not only are the researchers unable to agree on the objectives of financial statements, but they also disagree over the methods of deriving the prescriptions from the objectives.[3]

One characteristic common to the prescriptions and proposed accounting methodologies, however, is their failure to satisfy all practicing accountants and to be accepted generally by accounting standard-setting bodies. A committee of the American Accounting Association recently concluded that "a single universally accepted basic accounting theory does not exist at this time."[4]

The preceding observations lead us to pose the following question: What is the role of accounting theory in determining accounting practice? Our objective in this paper is to begin building a theory of the determinants of accounting theory. This theory is intended to be a positive theory, that is, a theory capable of explaining the factors determining the extant accounting literature, predicting how research will change as the underlying factors change, and explaining the role of theories in the determination of accounting standards.[5] It is *not* normative or prescriptive.[6]

Other writers have examined the relationship between accounting theory and practice. For example, Zeff [1974, p. 177] examines the historical relationship and concludes:

> A study of the U.S. experience clearly shows that the academic literature has had remarkably little impact on the writings of practitioners and upon the accounting policies of the American Institute and the SEC. *Too often, accounting theory is invoked more as a tactic to buttress one's preconceived notions, rather than as a genuine arbiter of contending views* (emphasis added).

Horngren [1973, p. 61] goes further and suggests an explanation for accounting theory's limited impact on the setting of accounting standards:[7]

> My hypothesis is that the setting of accounting standards is as much a product of political action as of flawless logic or empirical findings.

Our tentative theory is consistent with both Zeff's and Horngren's observations. It predicts that accounting theory will be used to "buttress preconceived notions" and further, it explains why. Our contribution to Zeff's and Horngren's ideas is to give them more structure so that we can make additional predictions about accounting theory. The source of that structure is economics. We view accounting theory as an economic good and examine the nature of the demand for and the supply of that good.

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[2] For example, Chambers [1966, Chapters 9–11] apparently adopts economic efficiency as an objective while the American Institute of Certified Public Accountants (AICPA) Study Group on the Objectives of Financial Statements [1973, p. 17] decided that "financial statements should meet the needs of those with the least ability to obtain information. . . ."

[3] Some writers (*e.g.*, Chambers [1966]) make assumptions about the world without regard to *formal* empirical evidence and derive their prescriptions using those assumptions. Others (*e.g.*, Gonedes and Dopuch [1974]) argue that prescriptions to achieve any given objective must be based on hypotheses which have been subjected to formal statistical tests and confirmed.

[4] American Accounting Association, [1977, p. 1]. This report also reviews the major accounting theories.

[5] The Committee on Concepts and Standards for External Reports, American Accounting Association [1977] examines many of these same questions, and the interested reader should refer to this committee report for an alternative explanation of these phenomena, specifically Chapter 4.

[6] The terms "normative" and "prescriptive" are used interchangeably. See Mautz and Gray [1970] for an example of prescriptions to "improve" accounting research and hence its impact on practice.

[7] See Sterling [1974, pp. 180–181] for Horngren's response to Zeff's initial remark.

Understanding why accounting theories are as they are requires a theory of the political process. We model that process as competition among individuals for the use of the coercive power of government to achieve wealth transfers. Because accounting procedures[8] are one means of effecting such transfers, individuals competing in the political process demand theories which prescribe the accounting procedures conducive to their desired wealth transfers. Further, because individual interests differ, a variety of accounting prescriptions, hence a variety of accounting theories, is demanded on any one issue. We argue that it is this diversity of interests which prevents general agreement on accounting theory.

While individuals want a theory which prescribes procedures conducive to their own interest, they do *not* want a normative theory which has their self-interest as its stated objective. The reason is that information is costly to obtain. Some voters will not obtain information on political issues personally. Those voters are not likely to support political actions which have as their stated objective the self-interest of others. The most useful theories for persuading uninformed voters are theories with stated objectives appealing to those voters, *e.g.*, the "public interest." As a result, individuals demand normative accounting theories which make prescriptions based on the "public interest." In other words, the demand is for rationales or excuses. Because it arises from the political process, the demand for normative, "public interest"-oriented accounting theories depends on the extent of the government's role in the economy.

Section II analyzes the demand for financial accounting and accounting theory first in an unregulated economy, in which the only role of government is to enforce contracts, and then in a regulated economy. In Section III, we examine the nature of the supply of accounting theories. Because of the diverse demands for prescriptions, we expect to observe a variety of normative theories. Further, we expect theories to change over time as government intervention changes. In Section IV we examine the effect of government intervention on extant accounting theory during the last century. Section V summarizes the issues and presents our conclusions.

II. THE DEMAND FOR ACCOUNTING THEORIES

This section analyzes the demand for accounting theories in an unregulated economy (Part A) and the additional demands generated by government intervention (Part B).

A. The Demand for Accounting Theories in an Unregulated Economy

1 Accounting in an Unregulated Economy. Audited corporate financial statements were voluntarily produced prior to government mandate.[9] Watts [1977] concludes that the original promoters of corporations or, subsequently, corporate managers have incentives to contract to supply audited financial statements. Agreements to supply financial statements were included in articles of incorporation (or by-laws) and in private lending contracts between corporations and creditors.[10] These contracts increase the welfare of the promoter or manager (who is raising the new capital) because they reduce the *agency costs*[11] which he bears.

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[8] Accounting "procedures," "techniques," and "practices" are defined as any computational algorithm used or suggested in the preparation of financial accounting statements. "Accounting standards" are those "procedures" sanctioned or recommended by an "authoritative" body such as the APB, FASB, SEC, ICC, *etc.*

[9] Benston [1969a] reports that as of 1926 all firms listed on the New York Stock Exchange published a balance sheet, 55 percent disclosed sales, 45 percent disclosed cost of goods sold, 71 percent disclosed depreciation, 100 percent disclosed net income, and 82 percent were audited by a CPA.

Agency costs arise because the manager's (the agent's) interests do not necessarily coincide with the interests of shareholders or bondholders (the principals). For example, the manager (if he owns shares) has incentives to convert assets of the corporation into dividends, thus leaving the bondholders with the "shell" of the corporation. Similarly, the manager has incentives to transfer wealth to himself at the expense of both the shareholders and bondholders (*e.g.*, via perquisites).

Bondholders and shareholders anticipate the manager's behavior and appropriately discount the price of the bonds or shares at the time of issue. Hence, the promoter (or manager) of a new corporation receives less for the shares and bonds he sells than he would if he could guarantee that he would continue to act as he did when he owned the firm (*i.e.*, when there were no outside shareholders or bondholders). This difference in the market value of the securities is part of the cost of an agency relationship, it is part of agency costs, and is borne by the promoter (or manager).[12] Jensen and Meckling [1976, p. 308] call it the "residual loss."

Because he bears the residual loss, the manager has incentives to make expenditures to guarantee that he will not take certain actions which harm the principal's interest or that he will compensate the principal if he does. These are "bonding" and "monitoring" expenditures and are additional elements of agency costs. Examples of such expenditures include contracting to restrict dividend payments and expenditures to monitor such dividend covenants.

The final element of agency costs is the utility of the increase in perquisites, wealth transfers, *etc.*, the manager receives because of his actions as an agent. An equilibrium occurs when the net costs of an agency relationship, the agency costs, are minimized by trading-off the decreases in the promoter's (or manager's) utility due to the residual loss, the monitoring and bonding expenditures, and the increased utility due to increased perquisites. The promoter or manager will write contracts for monitoring and bonding as long as the marginal benefits of these contracts (*e.g.*, reduction of the residual loss) are greater than the marginal costs (*e.g.*, the costs of contracting and the utility of any perquisites foregone). Moreover, since he bears the agency costs, the manager or promoter will trv to write the contracts and perform the bonding or monitoring at minimum cost. In fact, the Jensen and Meckling analysis suggests that the equilibrium set of contractual devices is the one which minimizes the agency costs associated with the separation of management and control and with the conflict of interests associated with the different classes of investors.

Promoters and managers voluntarily

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[10] In the period 1862–1900, many U.K. companies voluntarily adopted the optional articles included in Table A of the 1862 U.K. Companies Act. See Edey [1968], Edey and Panitpakdi [1956] and Watts [1977]. Examples of private contracts can be found today in any note or bond indenture agreement.

[11] Jensen and Meckling [1976, p. 308] define an agency relationship as "a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent." There are at least two agency relationships which cause corporate promoters and managers to bear agency costs. The first is the relationship between shareholders (the principals) and the manager (the agent) and the second is the relationship between the bondholders (the principals) and the manager (the agent).

[12] See Jensen and Meckling [1976] for a formal proof that he bears this cost.

included bonding covenants in corporate articles and by-laws in the nineteenth century. Dividend covenants were voluntarily included in company charters as early as 1620.[13]

Watts's [1977] analysis of agency relationships suggests that the function of audited financial statements in an unregulated economy is to reduce agency costs. This theory predicts that accounting practices (*i.e.*, the form, content, frequency, *etc.*, of external reporting) would vary across corporations in an unregulated economy depending on the nature and magnitude of the agency costs. Agency costs, in turn, are, among other things, a function of the amount of corporate debt outstanding and of the relative share of equity owned by the manager.[14] These variables affect the manager's incentive to take actions which conflict with the interests of shareholders and bondholders. Agency costs also vary with the costs of monitoring managers, which, in turn depend on the physical size, dispersion, and complexity of the firm. Further, the practices underlying financial statements will vary across firms because an accounting practice which minimizes agency costs in one industry may not minimize those costs in another.

As an example of the association between agency costs and accounting procedures, consider management compensation schemes in the nineteenth century. Some management compensation schemes in the nineteenth century were included in corporate articles. Those schemes tied management compensation to the firms' "profits" [Matheson, 1893, pp. vii–viii] to reduce the divergence between the interests of the managers and shareholders.[15] At that time "profits" were effectively operating cash flows, since accrual accounting was not used. [Litherland, 1968, pp. 171–172]. However, a cash flow "profit" index is susceptible to shortrun manager manipulation. The manager can reduce repairs and maintenance expenditures and increase cash flows and "profits,"[16] which would increase the manager's compensation.[17] In addition, reduced maintenance increases the ability of the corporation to pay current dividends. Such dividends could reduce the value of the creditors' claims and increase the shareholders' wealth.[18]

To reduce these agency costs of equity and debt, several contractual devices were used to decrease the likelihood that managers and shareholders would run down the value of the capital stock.

i) Dividends were restricted to a fixed proportion of profits, thereby creating a buffer.[19]
ii) Reserve funds of fixed amounts had to be maintained if dividends were to be paid.[20]
iii) Fixed assets were treated as merchandise accounts with changes in value (usually not called depreci-

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[13] See Kehl [1941, p. 4].

[14] Agency costs are also a function of the tastes of managers for non-pecuniary income, the extent of managerial competition, the degree to which the capital markets and the legal system are able to reduce agency costs, *etc*. See Jensen and Meckling [1976, pp. 328–330].

[15] The terms "shareholders" and "stockholders" are used interchangeably.

[16] See Matheson [1893, p. 5] for a report that managers did in fact adopt this tactic in the nineteenth century.

[17] See Matheson [1893, p. vii] for a statement that managers did in fact resist depreciation charges because of the effect on their compensation.

[18] See Smith [1976, p. 42]. Also, we find labor managed firms in socialist countries faced with the same agency problem. Labor has less incentive to maintain physical capital than an owner-manager. Jensen and Meckling [1977].

[19] For example, the General Bank of India had a provision in its charter limiting dividends to not more than ⅔ of net (cash) profits [DuBois, 1938, p. 365].

[20] The Phoenix Insurance Company, 1781, required a reserve fund of £52,000 before any dividends could be paid. *Ibid.*

ation) closed to profits prior to dividend distributions.[21]

In the latter procedure, depreciation was treated as a valuation technique which had to be estimated only in profitable years, since dividends were paid only in these years. A typical company charter requiring depreciation is:

> The directors shall, before recommending any dividend, set aside out of the profits of the company, but subject to the sanction of the company in general meeting, such sum as they think proper as a reserve fund for maintenance, repairs, depreciation and renewals.[22]

The court interpreted this article and the term "proper reserve" as a mechanism to account for declines in the capital stock.[23] Thus, the existence of a depreciation covenant (and hence the presence of depreciation in the financial statement) or other restrictions on dividends was a function of the amount of fixed assets and the nature and magnitude of the agency costs of debt.

Capital market participants contract to supply capital. Managers and owners seeking capital have incentives to enter into contracts which limit the agency costs they incur. But these contracts must then be monitored and enforced since managers have incentives to circumvent the contracts. For example, the promoter or manager of a corporation may contract to restrict dividends to, or base management compensation on, profits after a deduction for depreciation because such a covenant enables him to sell bonds and shares at a higher price. However, *after* the contract is written the manager has incentives to minimize that depreciation charge, thereby leading to increased profits (and potentially increased management compensation) and dividends which transfer wealth from bondholders to shareholders (including management). Thus, contracts will reduce agency costs only if they include provisions for monitoring. Since audited financial statements are useful devices to monitor these voluntary agreements between owners and managers, these statements serve a useful role in the capital markets and owner-managers will agree to provide them in advance.

2. *The Function of Accounting Theories*

The preceding analysis suggests that accounting theories will serve three overlapping functions in an unregulated economy.

i) *Pedagogic demand.* Accounting procedures are devised in order to reduce agency costs of contracts. Since these costs vary across firms, accounting procedures will vary, giving rise to diversity of techniques, formats, *etc.*[24] However, diversity in accounting procedures increases the difficulty of teaching the practice of accounting. Consequently, accounting teachers develop pedagogic devices (rules-of-thumb) to assist learning and to structure the variation found in practice. Theorists examine existing systems of accounts and summarize differences and similarities. These descriptions of practice highlight the tendencies of firms with particular attributes to follow certain accounting procedures.

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[21] See Littleton [1933, pp. 223–227].

[22] *Dent v. London Tramways Company*, 1880, in Brief [1976, p. 193].

[23] "Take the case of a warehouse: supposing a warehouse keeper, having a new warehouse, should find at the end of the year that he had no occasion to expend money in repairs, but thought that, by reason of the usual wear and tear of the warehouse, it was 1,000*l.* worse than it was at the beginning of the year, he would set aside 1,000*l.* for a repair or renewal or depreciation fund, before he estimated any profits; because, although that sum is not required to be paid in that year, it is still the sum of money which is lost, so to say, out of capital, and which must be replaced." *Ibid.*

[24] Prior to the creation of the Securities and Exchange Commission (SEC) in 1934, much variation existed in accounting procedures. See Blough [1937, p. 7]. In an unregulated economy, the market itself regulates the amount of diversity of accounting procedures. There are economies associated with using existing practices and terminology. If the firm adopts previously unknown accounting practices, then the users of the statements (*i.e.*, creditors monitoring shareholders and shareholders monitoring management) will incur costs in learning the new accounting procedures. If creditors and shareholders have alternative uses of their capital (*i.e.*, capital markets are competitive) the costs of the new procedures are ultimately borne by the shareholders and managers. Hence, new procedures (and increased diversity) will be implemented only if their added benefits offset the added costs they impose.

Nineteenth century accounting texts and articles indicate that accounting theorists recognized the diversity of practice and attempted to distill general tendencies from the diversity. For example:

> No fixed rules, or rates of depreciation can be established for general use, because not only do trades and processes of manufacture differ, but numerous secondary circumstances have to be considered in determining the proper course. It may, however, be possible to lay down some general principles which will always apply, or which, at any rate, may with advantage be held in view in deciding particular cases. [Matheson, 1893, p. 1]

Similarly, Dicksee and Tillyard's [1906] treatise describes current accounting practice for goodwill and the relevant court cases. Based on this description, the authors "enunciate general business principles and explain their practical application" [Dicksee and Tillyard, 1906, p. vii].

ii) Information Demand. In an unregulated economy there is a demand for writers to do more than just describe variations in accounting practice. There is a demand for predictions of the effects of accounting procedures on both the manager's and auditor's welfare via exposure to law suits. The auditor contracts with the shareholders (and creditors) to monitor management, and he is legally liable if he fails to report breaches of covenants in the corporation's articles or by-laws.[25] Furthermore, the demand for a given auditor's services is a function of the auditor's efficiency in monitoring management.[26] Hence, the auditor again has an incentive to understand how management's choice of accounting procedures affects agency costs.

Auditors would value information in the form of theories predicting how agency costs vary with accounting procedures. In particular, auditors would like to know how managers' actions and hence agency costs would be affected by alternative accounting procedures.

iii) *Justification Demand.* Early accounting textbooks warned that managers would use accounting to serve their own interests at the expense of shareholders. The second edition of Matheson [1893] contains examples of such warnings. Matheson provides illustrations of how managers can take advantage of deficiencies in the definition of depreciation, repairs, and maintenance charges to increase "profits" and their own compensation at the expense of shareholders and/or bondholders. For example, on page 5 he writes:

> The temptation to treat as Profit the Surplus of Income over Expenditure, without sufficient allowance for Deterioration, appears to be often irresistible. Thus, in the case of a Tramway undertaking in its first years of working, a dividend may be possible only by writing off little or nothing from the capital value of the cars, the harness, and the horses. This, of course, cannot last without the intro-

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[25] See the *Leeds Estate Building Company* case in Edwards [1968b, p. 148].

[26] Share prices are unbiased estimates of the extent to which the auditor monitors management and reduces agency costs (see Fama [1970] and Gonedes and Dopuch [1974] for a review of the evidence on market efficiency). The larger the reduction in agency costs effected by an auditor (net of the auditor's fees), the higher the value of the corporation's shares and bonds and, *ceteris paribus*, the greater the demand for that auditor's services. If the market observes the auditor failing to monitor management, it will adjust downwards the share price of all firms who engage this auditor (to the extent to which the auditor does not reduce agency costs), and this will reduce the demand for his services.

> duction of new capital, but in undertakings long established there yet may be epochs of fictitious profits due to various causes. For instance there may be neglect of repairs, which, when the necessity for them becomes evident, will involve a heavy outlay for renewals; or it may arise from actual fraud in postponing expenditure, so as to show large profits, which will raise the value of shares for stock-jobbing purposes. There are railways where the dividend income and the corresponding value of the shares have fluctuated considerably, not according to alterations in the real earnings, but according to alternate neglect and attention in regard to plant.

Accounting texts (and theories) which detail how managers seek to manipulate profits and the consequent effects of those manipulations on shareholders and bondholders not only improve the auditor's ability to monitor such behavior, but also provide the auditor with ready-made arguments to use against such practices in discussions with management. It is clear that Matheson's work fulfilled this role. William Jackson, a member of the Council of the Institute of Chartered Accountants in England and Wales, stated that he used Matheson's book in that fashion:

> To those who honestly and from conviction treat the subject on the only sound basis, it may seem superfluous to urge due consideration of the arguments so convincingly set out in these pages; but Auditors, and especially those who have to deal with joint-stock or other concerns where the remuneration of the management is made wholly or partly dependent upon declared Profits, know in what varied forms resistance to an adequate Charge against profits for Depreciation is presented.
>
> The fallacies underlying these objections present themselves again and again with the modifications caused by the lack of apprehension in some, or the ingenuity of others. *Mr. Matheson's work provides the Auditor with true antidotes to these fallacies, and it has been in past times used by the writer with satisfactory effect, where his own less-reasoned arguments have failed to convince.*
>
> He therefore recommends it afresh to the notice and for the support, where necessary, of members of his own profession, and of those who, untrained in the practice of Auditing, are confronted with unfamiliar and specious pretexts for avoiding the unwelcome charge against Profits [Matheson, 1893, pp. vii-viii] (emphasis added).

B. The Demand for Accounting Theories in a Regulated Economy

This section extends the previous analysis of the demand for theories to include the effects of government. We assume that private citizens, bureaucrats, and politicians have incentives to employ the powers of the state to make themselves better off and to coalesce for that purpose. One way by which coalitions of individuals are made better off is by legislation that redistributes (i.e., confiscates) wealth.

1. Accounting and the Political Process

Farm subsidies, tariffs, welfare, social security, even regulatory commissions[27] are examples of special interest legislation which transfer wealth. The business sector is both the source (via taxes, antitrust, affirmative action, *etc.*) and the recipient of many of these wealth transfers (via tax credits, tariffs, subsidies, *etc.*).

Financial accounting statements perform a central role in these wealth transfers and are affected both directly and indirectly by the political process. The Securities and Exchange Commission (SEC) regulates the contents of financial statements directly (upward asset revaluations are not allowed, statements of changes in financial position must be prepared, *etc.*). The Federal Revenue Acts also affect the contents of financial statements directly (*e.g.*, LIFO). In addition, regulatory commissions (*e.g.*, state public utility boards, various banking and insurance commissions, the Interstate Commerce Commission, the Federal Trade Commission) often affect the contents of financial statements.

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[27] See Stigler [1971], Posner [1974], and Peltzman [1976].

Besides these more direct effects, there are indirect effects. Government commissions often use the contents of financial statements in the regulatory process (rate setting, antitrust, *etc.*). Further, Congress often bases legislative actions on these statements.[28] This, in turn, provides management with incentives to select accounting procedures which either reduce the costs they bear or increase the benefits they receive as a result of the actions of government regulators and legislators.[29]

Since public utilities have incentives to propose accounting procedures for rate making purposes which increase the market value of the firm, their arguments are assisted if accounting standard-setting bodies such as the Financial Accounting Standards Board (FASB) mandate the same accounting procedures for financial reporting.[30] Consequently, managers of utilities and other regulated industries (*e.g.*, insurance, bank and transportation) lobby on accounting standards not only with their regulatory commissions but also with the Accounting Principles Board (APB) and the FASB.

Moonitz [1974 a and b] and Horngren [1973 and 1977] document instances of regulated firms seeking or opposing accounting procedures which affect the value of the firm via direct and indirect wealth transfers. Examples of other firms lobbying on accounting standards exist. Most of the major U.S. oil companies made submissions regarding the FASB's Discussion Memorandum on General Price Level Adjustments [Watts and Zimmerman, 1978].

2. *The Effect of Government Intervention on the Demand for Accounting Theories*

The rules and regulations which result from government regulation of business increase the pedagogic and information demands for accounting theories. Even beginning accounting textbooks report the income tax requirements of LIFO, depreciation, *etc.* Practitioners demand detailed texts explaining SEC requirements (*e.g.*, Rappaport [1972]), tax codes, and other government regulations.

The justification demand for theories also expands with regulation. The political process in the U.S. is characterized as an advocacy proceeding. Proponents and opponents of special interest legislation (or petitioners before regulatory and administrative committees) must give arguments for the positions they advocate. If these positions include changes in accounting procedures, accounting theories which serve as justifications (*i.e.*, excuses) are useful. These advocacy positions (including theories) will tend to be based on contentions that the political action is in the public interest,[31] that everyone is made better off, that most are made better off and no one is harmed, or that the action is "fair," since those contentions are likely to generate less opposition than arguments based on self-interest. Often, those public interest arguments rely upon the notion that the unregulated market solution is inefficient. The typical argument is that there is a market failure which can only be remedied by government intervention.

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[28] The reported profits of U.S. oil companies during the Arab oil embargo were used to justify bills to break up these large firms.

[29] See Watts and Zimmerman [1978] for a test of this proposition. Also, see Prakash and Rappaport [1977] for further discussion of these feedback effects. See a bill introduced into the Senate by Senator Bayh (U.S. Congress, Senate, Subcommittee on Anti-trust and Monopoly [1975, pp. 5–13] and [1976, p. 1893]). Note that it is absolute size and profits which are used as a justification. On this point, see the "Curse of Bigness," *Barron's* [June 30, 1969, pp. 1 and 8]. Also see Alchian and Kessel [1962, p. 162].

[30] The Interstate Commerce Commission based its decision to allow tax deferral accounting on APB Opinion No. 11. See Interstate Commerce Commission, *Accounting for Federal Income Taxes*, 318 I.C.C. 803.

[31] Other writers have also recognized the tendency for advocates to use public interest arguments. For example, Pichler [1974, pp. 64–65] concludes that the accounting profession has increased its economic power via control over entry "through legislation justified as protecting the public interest" (p. 64). "In most cases, *public rather than professional interest was cited as the primary reason for* [the legislation]" (p. 65) (emphasis added).

Politicians and bureaucrats charged with the responsibility for promoting the general welfare demand public interest testimony not only to inform them of the trade-offs but also for use in justifying their actions to the press and their constituencies. Consequently, when politicians support (or oppose) legislation, they tend to adopt the public interest arguments advanced by the special interests who promote (oppose) the legislation.

i) Examples of Public Interest or Market Failure Justifications. The reported objective of the Securities Exchange Act of 1934 and of required disclosure is stated by Mundheim [1964, p. 647]:

> The theory of the Securities Act is that if investors are provided with sufficient information to permit them to make a reasoned decision concerning the investment merits of securities offered to them, investor interests can be adequately protected without unduly restricting the ability of business ventures to raise capital.

This objective stresses economic efficiency. The statement suggests that required disclosure can increase investors' welfare at virtually zero cost (*i.e.*, that there is a market failure).

Examples of "public interest" justifications of accounting procedures are observed in rate-setting hearings for public utilities. For example, Public Systems, an organization that represents municipalities and rural electrification agencies, applied for a hearing on the Federal Power Commission's (FPC) Order 530 which allowed the use of income tax allocation in setting rates.[32] Order 530 increases the cash flow of electric utilities "at the expense of customers using electricity" and hence harms the interests of Public Systems. But, Public Systems did not argue that it is in its self-interest to oppose Order 530. Instead it argued that "normalization [income tax allocation] represents an *inefficient* means of subsidizing the public utility industry" [U.S. Congress, Senate, 1976, p. 683] (emphasis added).

Bureaucrats also use public interest arguments to justify their actions.[33] For example, the former SEC Chief Accountant, John Burton, a bureaucrat, justified the disclosure regulations imposed during his term in office by arguing:

> In a broad sense we hope [that disclosure regulations] will contribute to a more efficient capital market. . . . The way in which we hope that will be achieved is first by giving investors more confidence that they are getting the whole story and second by encouraging the development of better tools of analysis and more responsibility on the part of the professional analyst to understand what's going on. We think that by giving them better data we can encourage them in the direction of doing a better job, thus leading, we hope, to more effective [sic] capital markets [Burton, 1975, p. 21].

Government regulation creates a demand for normative accounting theories employing public interest arguments, that is, for theories purporting to demonstrate that certain accounting procedures *should* be used because they lead to better decisions by investors, more efficient capital markets, *etc.* Further, the demand is not for *one* theory, but rather for diverse prescriptions. On any political issue such as utility rate determination, there will be at least two sides. In the FPC Order 530 example, Coopers & Lybrand, who opposed Public Systems, wanted a theory which prescribed income tax allocation, while Public Systems wanted a theory which did not. When we consider that accounting methods are relevant to taxes, antitrust cases, union negotiations, disclosure regulations, *etc.*, as well as utility rate-setting, we expect a demand for a multitude of prescriptions.

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[32] U.S. Congress, Senate [1976, p. 59]. "Metcalf Staff Report."

[33] McGraw [1975, p. 162]. Also, see U.S. Securities and Exchange Commission [1945, pp. 1–10].

With increased government intervention in business, the demand for theories which justify particular accounting procedures (proposed in the self-interest of various parties) has come to eclipse the demand for theories which fulfill the pedagogic and information roles. We present evidence to support this proposition in Section V.

ii) Rationality or "Theory Illusion." Until recently, it had been popular in the economics literature to assume that politicians, elected officials, bureaucrats, *etc.*, acted in the "public interest" (the public interest assumption).[34] In order to determine which actions are in the public interest, politicians require theories which predict the consequences of alternative actions. "Rational," "public interest"-oriented politicians/bureaucrats would tend to use the theories which best predict (*i.e.*, the "best" theories)[35] and hence those theories would predominate. Leading articles in the accounting literature are implicitly based on the public interest premise (AAA [1966, p. 5], AICPA [1973, p. 17], Gonedes and Dopuch [1974, pp. 48–49 and pp. 114–118], Beaver and Demski [1974, p. 185]) that the "best" theories prevail.

In recent years, however, economists have questioned whether the public interest assumption is consistent with observed phenomena.[36] They have proposed an alternative assumption—that individuals involved in the political process act in their own interest (the self-interest assumption). This assumption yields implications which are more consistent with observed phenomena than those based on the public interest assumption.[37]

The costs and benefits to voters of becoming informed, of lobbying, of forming coalitions, and of monitoring their representatives' actions are of central importance in a self-interest model of the political process. Downs [1957] suggests that the expected effect of one individual's vote on the outcome of an election is trivial, and, hence, the individual voter has very little incentive to incur the costs of becoming informed on political issues. On the other hand, individual voters do have incentives to act as groups in the political process. Economies of scale in political action encourage group participation. When several voters have similar interests on particular issues (*e.g.*, members of a trade union), those voters can share the "fixed" costs of becoming informed and moreover can increase the likelihood of affecting the outcome of an election by voting as a bloc.[38]

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[34] For a summary of this literature see Posner [1974] and McCraw [1975].

[35] By "best" theory, we mean the theory most consistent with observed phenomena. Such theories allow public officials to predict the outcomes of their actions, thereby helping them select actions which increase social welfare.

[36] See Posner [1974].

[37] For analyses of the political process based on this assumption see Downs [1957], Jensen [1976], Meckling [1976a and b], Mueller [1976], Niskanen [1971], Peltzman [1976], Stigler [1971], and Leffler and Zimmerman [1977].

[38] Stigler [1971] attempts to explain the regulation of an industry on the basis of variation of coalition costs, free-rider costs, *etc.*, with such variables as group size, homogeneity of interests, *etc.*

The costs of political action also depend on the existing political institutions (*e.g.*, whether political decisions are made by referendum or a vote of elected representatives) [Leffler and Zimmerman, 1977]. If we call the sum of the costs of political action the "transactions costs" of political decisions, the crucial question is "what is the magnitude of these transactions costs?" If the transactions costs of political decisions are high, self-interest motivated government servants will not always act in the public interest; if they are zero, they will.[39] Hence, if the transactions costs of the political process are high, government officials will not use the "best" theory available; if they are zero, they will.

As an example of the importance of positive political transactions costs, consider the manager of a utility advocating deferred tax accounting because of its effects on utility rates. The manager will argue that recognizing deferred taxes as current operating costs is in the public interest. The official responsible for allowing or not allowing this practice has a greater incentive to resist the lobbying efforts of the utility manager if other individuals (*e.g.*, consumer advocates) lobby against the procedure. Whether those individuals lobby depends on the costs of consumers being informed about the effects of the accounting procedures on their welfare (which requires human capital), the costs of forming groups to oppose the procedure, *etc.* The manager's public interest theory (which is an "excuse" to cover a self-interest motive and need not be valid) increases the costs of others being informed and will tend to be accepted by the public official *if* the transactions costs are large enough.

We assume that political transactions costs are large enough to cause the acceptance of "invalid" theories, that the competition among excuses does not always lead to acceptance of the "best" theory. The usefulness of that assumption depends on the empirical consistency of its implications. It is an empirical question. The work by Posner [1974], Stigler [1971], and Peltzman [1976] supports the assumption.

The assumption that the transactions costs of the political process are non-zero is analogous to the assumption of non-zero transactions costs in capital markets.[40] In capital market theory it is typically assumed that transactions costs are zero despite the fact they obviously are not, because that assumption yields empirically confirmed hypotheses. Why then, should political transactions costs be sufficiently more important than capital market transactions costs to warrant their inclusion in a political theory?

We suggest that there is an important difference between capital markets and the political process which make transactions costs important in the latter case. There is, in the capital markets, a direct market for control. If the manager of a corporation is not maximizing the market value of the corporation's shares, then an individual can, by buying its shares, acquire control of the corporation in the capital markets and, therefore, obtain the right to make the decisions. That individual can change the corporation's decisions and reap for himself the capital gain from the increase in the value of the corporation's stock. If the Chairman of the Securities and Exchange Commission were not making decisions in the public interest, an individual could not directly buy the right to make those decisions and capture the benefits of the changed decision. Because direct payments to elected officials are illegal and payments in kind are generally more expensive, it is costlier to bribe Congressmen, Senators, *etc.*, than to purchase a controlling interest in a corporation. It is also costly to establish indirect ways of achieving the same result.[41]

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[39] The social choice literature (see Mueller [1976]) discusses the conditions which guarantee Pareto-efficient decisions by regulators.

[40] See Fama [1976] for a review of capital market theory.

Notice that in our model of the political process everyone is rational. No one is being "fooled" by accounting theories; they are not "fooled" by "theory illusion."[42] If people do not investigate the validity of theories, it is because they do not expect such investigation to be worthwhile. If the expected benefits of investigation to an individual are small, he will make only a limited investigation.

Our assumption of high political costs is crucial to our theory. As we shall see in the next section, the assumption enables us to discriminate between the empirical implications of our theory and the implications of an alternative theory. This allows empirical testing. Ultimately, the test of the political cost assumption is whether the implications of the theory based on the assumption are confirmed or not by empirical tests. Thus, the merit of an assumption is judged by the predictions it generates. Those accounting researchers who build theories on the assumption that information is a pure public good (*e.g.*, Gonedes and Dopuch [1974] and Beaver [1976]) often assert that information is a pure public good. Yet, no tests of these theories have been provided. In Section IV we argue that implications of our theory are consistent with the evidence.

III. THE SUPPLY OF ACCOUNTING THEORIES

Accounting theorists often view themselves as expert critics or defenders of accounting prescriptions (*e.g.*, replacement cost, historical cost, *etc.*). They argue that accounting theory should be used to determine accounting practice and standards.[43] The ideal state of affairs to them is one in which theorists logically and objectively determine the merits of alternative procedures.[44] For example, Hendriksen [1977, p. 1] writes: "... the most important goal of accounting theory should be to provide a coherent set of logical principles that form the general frame of reference for the evaluation and development of sound accounting practices." Theorists tend to bemoan the fact that this ideal state does not exist and that corporate managers, auditors, and politicians do not allow them to determine accounting standards.[45]

Most theorists probably believe that an objective of their research and the reason they supply theories to provide knowledge which will ultimately improve accounting practice. They would not regard themselves as supplying "excuses." But we suggest that the predominant contemporary demand for accounting theories (the demand for accounting in a regulated economy) is the demand for justifications—"excuses." If that empirical proposition is correct, the question is: How responsive is the supply side (accounting research) to changes in the nature and quantity of the economic good being demanded?

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[41] See Zimmerman [1977] for further discussion of this issue. Essentially, the reason it is costlier to purchase "control" of the political system (via a system of bribes, payoffs, *etc.*) is that the legal system does not enforce these contracts to the same extent that the state enforces the property rights of residual claimants in corporations. Hence, more (costly) monitoring is required to enforce contracts between politicians/bureaucrats and other parties.

[42] Buchanan and Wagner [1977, pp. 128–130] introduce the concept of "fiscal illusion" as a systematic bias in individuals' perceptions of the differential effects of alternative taxing procedures. They hypothesize "that complex and indirect payment structures create a fiscal illusion that will systematically produce higher levels of public outlay than those that would be observed under simple-payment structures." (p. 129) It could be argued that individuals also suffer from "theory illusion" (*i.e.*, that more complex theories obscure political behavior). We do not subscribe to this phenomenon, but offer it as an alternative explanation.

[43] Mautz [1966, p. 6] and Sterling [1973, p. 49].

[44] Ijiri [1971, p. 26] states, "Accounting theorists are scientific observers of accounting practices and their surrouding environment. Their theories are required to have the highest degree of objectivity."

[45] Moonitz [1974b] does not believe that accounting research should be the sole source for setting practice, but that it should have a role, "Almost everyone agrees that research is an essential component of the process of establishing accounting standards" (p. 58). He goes on to suggest that "accountants must curb the power of the management" (p. 68).

As long as there exists a large number of individuals who are able to supply a wide diversity of theories (*i.e.*, as long as numerous close substitutes exist) at relatively low cost, then supply will be very responsive to demand. Stigler's observation succinctly summarizes this point:

> . . . consumers generally determine what will be produced, and producers make profits by discovering more precisely what consumers want and producing it more cheaply. Some may entertain a tinge of doubt about this proposition, thanks to the energy and skill of Professor Galbraith, but even his large talents hardly raise a faint thought that I live in a house rather than a tent because of the comparative advertising outlays of the two industries. This Cambridge eccentricity aside, then, *it is useful to say that consumers direct production—and therefore, do they not direct the production of the words and ideas of intellectuals, rather than, as in the first view, vice-versa?* [Stigler, 1976, p. 347] (emphasis added).

The consumers ("vested interests") determine the production of accounting research through the incentives they provide for accounting theorists. The greater the prestige and articulation skills of an accounting researcher, the more likely practitioners, regulators and other academics will know his work and the greater the flow of both students and funds to his university. Researchers have non-pecuniary incentives to be well-known, and this reputation is rewarded by a higher salary and a plenitude of research funds.[46] Practitioners, regulators, and those teaching future practitioners are more likely to read or hear of the output of an accounting researcher if it bears on topics of current interest. As a result, the researcher who is motivated by pecuniary and non-pecuniary factors (*e.g.*, "free" trips to conferences) will tend to write on the current controversies in accounting. Therein lies the connection to the demands of vested interests. Controversies arise in accounting when vested interests disagree over accounting standards. For example, the LIFO controversy arose when the Supreme Court outlawed the base stock method of valuing inventory for tax purposes and the American Petroleum Institute recommended LIFO to replace it, thereby reducing the present value of its members' taxes. The Internal Revenue Service resisted because of the effect on revenues. The parties demanded pro and con LIFO theories which were eventually produced [Moonitz, 1974, pp. 33–34].

Accounting researchers often include a set of policy recommendations as part of their research project.[47] Those recommendations, made on the basis of some objective assumed by the researcher, may never have been intended to serve as an "excuse" for the corporate manager, practitioner or politician who prefers the recommended procedure for self-interest reasons. Nevertheless, the research findings will be favorably quoted by those with vested interests.[48] The more readable the research, the more frequently it is quoted, the more the researcher's fame increases. Similarly, criticisms of alternative accounting practices will be quoted by vested interests and will also increase the researcher's reputation.

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[46] Even though we have argued the existence of close substitutes, all researchers will not be earning the same compensation. Higher compensation will accrue to the most prolific, articulate, and creative advocates—to those who are able to establish early property rights in a topic and thus must be cited by later theorists.

[47] See Beaver [1973] for an example of policy prescriptions based on accounting research.

[48] An interesting case in point is the work of Ijiri [1967 and 1975]. Ijiri claims to be a positivist—". . . the

The link between suppliers of accounting theory and consumers goes further than mere quotation. Partners in accounting firms, bureaucrats in government agencies and corporate managers will seek out accounting researchers who have eloquently and consistently advocated a particular practice which happens to be in the practitioner's, bureaucrat's, or manager's self-interest and will appoint the researcher as a consultant, or expert witness, or commission him to conduct a study of that accounting problem. Consistency in the researcher's work allows the party commissioning the work to predict more accurately the ultimate conclusions. Thus, research and consulting funds will tend to flow to the most eloquent and consistent advocates of accounting practices where there are vested interests who benefit by the adoption or rejection of these accounting practices.

The tendency of vested interests to seek out researchers who support their position produces a survival bias.[49] The bias is introduced by the vested interests. We do not mean to impugn the motives of accounting researchers who advocate particular practices. In fact, the more consistent the positions of the researcher and the greater his integrity, the more support he lends to the vested interest's position.

Given the rewards for supplying theories on controversial issues, we expect to observe competition in the supply of accounting theories related to those issues. The prescriptions for an issue are likely to be as diverse as the positions of vested interests. But despite this diversity, we do not necessarily expect accounting researchers to be inconsistent from issue to issue. Academic evaluation and criticism create incentives for each researcher to be consistent. However, the rationales given for observed accounting standards may well be inconsistent across issues and different sections of the same accounting standard.

Rationales differ (and are inconsistent) across accounting standards because a standard is the result of political action. The outcome depends on the relative costs which the various involved parties are willing to incur to achieve their goals. And these costs will vary with the expected benefits. The rationale given for a standard will be the successful party's rationale; and if it is a compromise, such as APB Opinion 16 on business combinations, mixtures of rationales will be used.[50] The same party is not successful in every issue; indeed many are not even involved in every issue. Further, vested

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purpose [of this book] is a better understanding of the foundations of accounting as it is and not as someone thinks it ought to be." [1967, p. x] He states that his work "is not intended to be pro-establishment or to promote the maintenance of the status quo. The purpose of such an exercise is to highlight where changes are most needed and where they are feasible." [1975, p. 28] But, then, in the same monograph (pp. 85–90), Ijiri presents a defense of historical costs, saying, "Our defense of historical cost should not, however, be interpreted to mean that historical cost is without any flaw" (p. 85). Ijiri concludes this defense with a statement, "We should in fact try to improve the accounting system based on historical cost not by abandoning it, but by modifying it (*e.g.*, through price level adjustments) and supplementing it with data based on other valuation methods" (p. 90). Despite being a professed positivist, Ijiri is making a strong normative statement. No wonder the AAA [1977, p. 10] committee when summarizing Ijiri [1975] concludes, "[he] defends historical cost against the criticisms of current-cost and current value. . . ." At least part of the "market" views Ijiri as a defender of the status quo.

[49] Just as in any market, those who produce what is demanded have a better chance of survival than those who do not.

[50] See Zeff [1972, pp. 212–216] for an account of this compromise.

interests (*e.g.*, an insurance company) are less constrained to give consistent rationales across issues. Hence, we observe a party supporting historical cost valuation in some cases and market valuation in others.[51]

If political transactions costs are high so that there is a demand for excuses which are useful weapons in the political arena, if the demand for accounting theory is dominated by that demand for excuses, and if demand determines production, accounting theories will be generated by, not generate, political debates. We will observe the nature of accounting theory changing as political issues change. Accounting theory will change *contemporaneously* with or *lag* political issues. We will *not* observe accounting theory generally *leading* political action.

Contrast the preceding predictions to what we would expect under alternative theories of accounting theory. The only alternative theory which we can even partially specify is that theories in the accounting literature are used to further the "public interest" (*i.e.*, they assist politicians or bureaucrats in producing regulations to further the "public interest"). In order for politicians or bureaucrats to use that literature we would have to observe the theories appearing in the literature before or, at best, at the same time as the relevant regulation. The appearance of the theories in the literature could not *lag* the regulation. Thus, we can discriminate between our theory and the alternative public interest theory if the appearance of theories in the literature tends to lead or lag regulation. If it tends to lead, the public interest hypothesis is supported. If it lags, our theory is supported. On the other hand, if the literature and regulation are contemporaneous we cannot discriminate between the two hypotheses.

It is important to remember that we are attempting to explain accounting theory as it is represented in the accounting literature (see footnote 1). It is conceivable that an accounting theory could be produced and used in the political process to institute a regulation, but not appear until later in the accounting literature. In other words, the "public interest" could, in fact, motivate the theory and the regulation, but the publication of the theory nonetheless, could, lag legislation. In that case, neither the public interest theory nor our theory could explain the accounting literature. In essence, we would be left without a theory of the literature. However, those who would argue such a scenario must then produce another explanation for, or theory of, the accounting literature.

In Section IV we compare the timing of general movements in the accounting literature to the timing of regulation to see if *a priori* the evidence supports our theory or the public interest theory. We do not present any formal tests which discriminate between the two theories, although we believe such tests could be performed (*e.g.*, by using citation tests). However, the serious problem in doing a formal test is that the public interest theory, like other alternative theories, is poorly specified. Hopefully, this paper will cause others to specify the public interest theory better or specify alternative theories of the accounting literature so that testing is facilitated.

One or two papers discussing a topic prior to the time the topic becomes politically active is not sufficient to reject our theory, just as one or two "heads" is not sufficient to reject the hypothesis that a given coin is "fair." It is important to remember that as in all empirical theories we are concerned with

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[51] Ernst & Ernst [1976] has proposed that replacement cost be used for depreciable assets while historical costs be continued for other assets.

general trends. Our predictions are for the accounting literature in general. We are not purporting to have a theory that explains the behavior of all accounting researchers or the acceptance, or lack of acceptance, of every published paper. There are many interesting phenomena that this theory, at this stage of development, cannot yet explain. But this does not *ipso facto* destroy the value of the theory.

Our analysis suggests that the accounting literature is not the simple accumulation of knowledge and consequent development of techniques. It is not a literature in which, as Littleton suggests.[52] concepts become better understood and consequently leads to "better" accounting practices. Instead it is a literature in which the concepts are altered to permit accounting practices to adapt to changes in political issues and institutions.

In this section, the existence of close substitute suppliers of theories was shown to make the supply of accounting "excuses" very responsive to the demand. In the next section we argue that the evidence we have gathered is consistent with the proposition that the market for accounting research is the market for "excuses" and suggests that the theory will be confirmed in formal testing.

IV. THE EMPIRICAL RELATIONSHIP BETWEEN GOVERNMENT INTERVENTION AND ACCOUNTING THEORY

If the demand for "excuses" is important in determining the output of accounting theorists, we expect to observe changes in accounting theory when a new law is passed which impinges on accounting practice. This section examines how accounting practice and theories were affected by several major types of legislation. We have selected three types of legislation which we believe have had a pronounced impact on accounting theory: the laws regulating railroads, the income tax laws, and the securities acts.

In this section we do not purport to present an exhaustive list of legislation which has created a demand for accounting "excuses" or to present a complete analysis of each type of legislation. Our objective is merely to present *prima facie* support for the hypothesis that accounting theory has changed *after* the introduction of government regulation.

When dealing with historical events such as government regulation, the "evidence" presented is always subject to interpretation and the *ex post* selection bias of the researchers. Critics can always charge that "strategic sampling" of references produced the results. In fact, much of the economic theory of regulation suffers from this *ex post* rationalization. However, at this early stage in the development of the theory, an *ex post* case study approach has yielded insights [Posner, 1974] and appears to be the logical and necessary precursor to a general theory of regulation. We are aware of these methodological problems. Even though the evidence we present is somewhat "casual," and not as "rigorous" as we would like, it is, nonetheless, evidence.[53] Furthermore, we have endeavored to choose the references from the standard, classical accounting literature. Undoubtedly, conflicting citations and references exist. Critics can, will, and should raise these conflicting citations, keeping in mind the statistical fallacies of drawing inferences based on sample sizes of one. We do not contend that all issues are settled, but rather encourage others to pursue, correct, and extend our analysis.

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[52] "There is little evidence of fresh ideas regarding depreciation until the middle of the nineteenth century. The appearance of steam railroads at that time directed attention as never before to fixed assets and their associated problems of maintenance, renewal and improvement. Out of the discussion and experience which followed, new ideas about depreciation took form and the ground was prepared for a better comprehension of the real nature of depreciation itself" [Littleton 1933, p. 227].

[53] It is tempting to suggest citation tests of the theory (*i.e.*, the frequency of articles on a subject increases with regulation). Besides the obvious cost of such a test, it suffers from the interpretation bias of the researchers. Also, how should changes in terminology be controlled? We would welcome anyone who can overcome these methodological difficulties to perform the tests.

A. Railroad Legislation

The growth of railroads is considered by many accountants to have been very important in the development of accounting theory, Hendriksen [1977, p. 40] lists it as one of the main influences on accounting theory in the period from 1800 to 1930. Littleton [1933, pp. 239–241] is more specific; he ascribes the development of depreciation accounting and the concern with depreciation in the literature in the nineteenth century to the growth of railroads.

There is no doubt that the development of railroads both in the U.S. and the U.K. affected the accounting literature on the nature of depreciation, including the question of charging depreciation as an expense [Pollins, 1956; and Boockholdt, 1977]. Holmes [1975, p. 18] writes:

> Depreciation was a knotty problem for these early railroad accountants. They argued over it, scorned it, denied it, anatomized it, and misused their own concepts. But in the end it was from the very ashes of their disagreements that our modern concepts of depreciation rose Phoenix-like fifty years later.

This literature existed at least by 1841 in the U.K. [*The Railway Times*, October 30, 1841, quoted in Pollins, 1956] and by 1850 in the U.S. [Dionysius Lardner's book quoted in Pollins, 1956]. Although the debate did not result in depreciation being treated as an expense in either the U.S. or U.K.,[54] theories of depreciation were enunciated. Consequently, given our theory, we have to answer two questions: (1) why did this depreciation debate arise with the railroads (*i.e.*, was there some government regulation or political action present in the case of the railroads that was not present for earlier corporations); and if so, (2) did that government regulation or political action precede the literature?

(1) *The reason for the debate* was investigated by Littleton [1933]. He asserts that two conditions were necessary to the development of depreciation accounting—corporations with limited liability and long-lived assets. He suggests that limited liability was a necessary condition, because it led to covenants restricting dividends to profits and thereby created the demand for financial statements which report profits (see Section II). Long-lived assets were important because, if they had not existed, there would have been no necessity to calculate depreciation to determine profits.

We think that Littleton's analysis is incomplete. *First*, agency costs of debt and equity exist whether or not a corporation has legally limited liability. Limited liability merely shifts some of the risk [Jensen and Meckling, 1976, pp. 331–332]. Given that the function of dividend covenants is to reduce the agency costs of debt, it is not surprising to observe them existing as early as 1620 for U.K. companies, long before limited liability was generally recognized for companies. We can easily amend Littleton's argument for this defect; for the first condition of limited liability, we substitute the existence of dividend covenants.

Second, dividend covenants and long-lived assets would not necessarily lead to depreciation being treated as an *expense*. The dividend covenants put a lower bound on the equity participation of shareholders. As long as sufficient earnings have been retained in the past to cover the depreciation of fixed assets to the current time, there would be no necessity to deduct depreciation systematically each year. We do not observe depreciation being treated as an expense prior to this century. Instead it was treated as an allocation of profits.

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[54] The general practice in both countries came to be the writing-off of the value of fixed assets at the time of retirement of the asset.

This suggests that Littleton's analysis has not been supported empirically. Observation of his two conditions would not necessarily be accompanied by depreciation being treated as an expense. Littleton's two conditions existed in the seventeenth and eighteenth centuries (dividend covenants can be observed as early as 1620 and were included in company charters as a general practice in the eighteenth century). Limited liability for U.K. companies existed *de facto* at least by the 1730s and was explicitly recognized by 1784.[55] The U.K. trading companies of the seventeenth and eighteenth centuries certainly had long-lived assets—forts and ships. Yet, we do not observe any real concern with depreciation expense until the nineteenth century.

Littleton recognized that his analysis was inconsistent with observed phenomena and that some other variable was necessary to explain the absence of concern about depreciation expense in both accounting theory and practice. He eloquently expresses the inconsistency [Littleton, 1933, p. 240]:

> The simultaneous appearance of these two elements—active, long-lived assets and a special need for the careful calculation of net profit—seems to be essential to the recognition of the importance of depreciation. Before these two are joined depreciation is incidental to the profit calculation; afterward it becomes indispensable. First in the trading companies, later in the railroads, these two elements were united and the foundations for depreciation accounting were laid. But, so far as could be learned, the depreciation of ships and forts did not receive consideration in the trading companies' bookkeeping, while the railroads, as has been seen, did give considerable attention to the problem of wear and tear of roadway and equipment. *Apparently some third element was also needed, which was present in the case of the railroads* but not earlier (emphasis added).

Littleton [1933, p. 240] suggests that the missing variable is knowledge, that it took 200 years for the nature of the corporation to become known. We suggest that a more plausible explanation is that, in the case of railroads, fares and rates were regulated by government on the basis of "profits."

Both in the U.S. and the U.K., some transportation prices were regulated before the existence of railroads. For example, the rates of the Fort Point Ferry (U.S.), incorporated in 1807, were, according to its charter, to be fixed by the court. [Dodd, 1954, p. 258]. However, railroad rates came to be tied to profits. The early U.S. railroad charters often had provisions for the adjustment of their rates based on profits. For example, the charter of the Franklin Railroad Company, incorporated in Massachusetts in 1830, included the following provision:

> if at any time after the expiration of four years from the completion of the Road, the net in-

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[55] See DuBois [1938, pp. 94–95] for a report on the incorporation proceedings of the Albion Flour Mill in 1784. In those proceedings, the Attorney General gave an opinion on limited liability which caused DuBois to conclude that, "for England at any rate, the fact of incorporation either by the Crown or by Parliament came to be the criterion for the extent of limited liability" (p. 96). Note, however, that it was theoretically possible for shareholders of insolvent companies to be made subject to calls. (See DuBois, pp. 98–103). DuBois (p. 95) recognized that *de facto* limited liability existed in the 1730s and 1740s: "it should be noted that through the financial tribulations of the Charitable Corporation, the York Buildings Company, and the Royal African Company, which in the thirties and forties were making life miserable for their creditors, there was no suggestion of any attempt to proceed against the personal estates of the members of the corporations."

> come shall have amounted to more than ten percent per annum, from the date of the completion aforesaid, upon the actual cost of said Road, the Legislature may take measures to alter and reduce the rates of toll and income, in such manner as to take off the overplus for the next four years, calculating the amount of transportation and income to be the same as the four preceding years; and, at the expiration of every four years thereafter the same proceeding may be had [Dodd, 1954, p. 260].

The charters of three other railroads incorporated in Massachusetts in the same year included a similar provision. [Dodd, 1954, p. 261].

The private acts of Parliament incorporating the early U.K. railroads typically fixed the maximum rates explicitly; but, in one notable exception, the Liverpool and Manchester Railway Act in 1826 limited the company's dividends to ten percent of the capital and required that its rates be reduced by five percent for each one percent of dividend above ten percent [Pollins, 1956, pp. 337–338]. Parliament soon began regulating railroad profits. In 1836, James Morrison sought to have Parliament restrict the profits of all railways. Clauses in Gladstone's 1844 Bill,

> authorized the Board of Trade to consider the position and profits of any railway which had a charter for fifteen years and to decide whether to buy it up on prescribed terms or, alternatively, to revise all its charges if it had made a profit of more than ten percent on its capital for three consecutive years [Cooke, 1950, p. 135].

Though these clauses were weakened in the actual Railways Regulation Act of 1844, a principle was established. Cooke [1950, p. 136] explains,

> The Act therefore fell short of the designs of Gladstone's committee and it is notable not for any reform it accomplished but rather for the principle embodied in it, that railway companies were one example of a class of company which was formed under special Parliamentary sanction to carry on an undertaking of a special public nature. Since for this purpose it had special powers, it should therefore be subject to special scrutiny and (if necessary) control by the State on behalf of the public.

The question of railroad profits and the public interest was raised in the political process in both the U.S. and the U.K. in the nineteenth century. Hence, it is not surprising that questions of calculating profits and whether depreciation should be charged as an expense were raised. The accounting methods of treating capital additions, depreciation, repairs and renewals, *etc.*, could affect reported profits and hence the rates and market values of railroads. Thus, there was a demand for rationalizations of alternative procedures.

The political issue of railroad profits led several U.S. states (Virginia (1837), New Hampshire and Rhode Island (1841), New York (1855), Massachusetts (1869) and Illinois (1869)) to pass legislation which in some way regulated railroads, usually by "controlling extortionate rates." [Boockholdt, 1977, p. 13; Johnson, 1965, p. 218; and Nash, 1947, p. 2]. According to Nash [1947, p. 3], "Several of the early state laws called for statements of provision for depreciation in annual reports but without definition as to what such provisions should be." Arguments for depreciation are expected to follow such regulations. Finally, in 1887 federal legislation established the Interstate Commerce Commission to prohibit unreasonable rates and price discrimination, control mergers, and prescribe a uniform system of accounts. The Interstate Commerce Commission adopted an accounting policy of charging "repairs or renewals of ties, rails, roadway, locomotives and cars under the classification 'operating expenses' [which typically results in higher reported expenses than depreciation] but did not mention depreciation" [Littleton, 1933, p. 236].

Although railroads were the prime target of regulation, the rates of other public utilities were also regulated in the nineteenth century. A Gas Commission was established in Massachusetts in 1885 and two years later was expanded to regulate electric companies. Later, it was given control over capitalization and rates [Nash, 1947, p. 3]. Municipalities regulated water company rates (*Spring Valley Water Works v. Schottler* (1883)) [Clay, 1932, p. 33] and such regulation led to legal disputes over whether depreciation should be considered in determining rates (*San Diego Water Co. v. San Diego*) [Riggs, 1922, pp. 155–157]. In addition, states regulated the charges for grain elevators (*Munn v. Illinois* (1877)) [Clay, 1932, p. 30].

It is our hypothesis that rate regulation (primarily of the railroads) created a demand for theories rationalizing depreciation as an expense. Furthermore, we expect that the more popular of these theories would stress that it is in the "public interest" for depreciation to be treated as an expense. Without regulation there was no necessity for depreciation to be a charge, systematically deducted each year in determining net income. However, because rate regulation was justified in terms of restricting the economic profits of monopolists (or eliminating "ruinous" competition), regulation created a demand for justifications arguing for depreciation to be treated as an annual charge to profits. Furthermore, because regulatory legislation was often based on economic arguments, theories of depreciation came to be couched in terms of economic costs.

(2) *The timing of the debate* appears to confirm our hypothesis that political action generated accounting theory, not vice-versa. As we have seen, the early U.S. railroad charters in the 1830s included provisions for regulation of profits. Those charters *precede* the debates observed in the accounting literature. The move by Morrison to have Parliament regulate the profits of U.K. railroads also *precedes* the debates.

B. *Income Tax Acts*

The influence of the income tax laws on financial reporting *practice* is well known and much lamented by academics.[56] That influence is very obvious in the practice of charging depreciation to net income, rather than treating it as an allocation of profit. Saliers [1939, pp. 17–18] describes the effect of the 1909 Excise Tax Law, the forerunner of the 1913 Income Tax Law:

> "Financial looseness" describes the accounting practices of industries in general at that time. The company bookkeepers, when closing their books, based the amount of the depreciation charge on the amount of profit earned in that year. A lean year caused the property to receive little or no charge for depreciation, while a prosperous year caused a liberal allowance to be made. The authorities had reason for either action at their fingertips, shifting one side to the other as conditions warranted. But after the year 1909 the shift was to the side of larger depreciation charges, for in that year the Corporation Excise Tax Law was enacted. This law levied a 1% tax on net income of corporations in excess of $5,000. This net income was said to be the figure resulting after deducting ordinary and necessary expenses and all losses, including an allowance for depreciation, from gross profit. Depreciation expense was made

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[56] Hendriksen [1977, p. 49] states, "The effect on accounting theory of taxation of business incomes in the United States and in other countries has been considerable, but it has been primarily indirect in nature.... While the revenue acts did hasten the adoption of good accounting practices and thus brought about a more critical analysis of accepted accounting procedures and concepts, they have also been a deterrent to experimentation and the acceptance of good theory."

> an allowable deduction and was universally deducted by those corporations affected by the act. The effect of this act on the growth of the use of the depreciation charge cannot be overemphasized. *It was the first instance in which the writing off of depreciation as expense was definitely advantageous. That fact alone insured its general application* (emphasis added).

The influence of tax laws on accounting theory appears to be as dramatic as Saliers' description of the U.S. tax laws' effect on accounting practice, particularly with respect to depreciation. Concern with depreciation as an expense existed only in the *railroad* accounting literature until the 1880s. In that decade we observe a spate of U.K. journal articles and textbooks on the question of depreciation for corporations in *general*. We do not observe the same concern in the U.S. at that time. This raises the question of why the sudden concern with depreciation in the U.K., not just for public utilities, but for all corporations. Further, why did such a concern with depreciation for all corporations not manifest itself in the U.S.?

Brief [1976, p. 737] suggests that the U.K. literature was motivated by a concern with "paying dividends out of capital" and that "accountants sought first of all to clarify theory, and second, to understand their responsibility in these matters. However, they were offered little assistance from judicial and statutory authority which failed to specify rules of accounting behavior." Although the accounting authors of the time may have suggested that was the problem, we think it is a very unsatisfactory answer to the question of what really motivated the literature for two reasons. First, we have already noted that the "profits available for dividends" question had existed for 260 years. Second, there was no uncertainty in the law as to when depreciation should or should not be deducted before determining "profits available for dividends." The legal decisions were consistent: if the corporate articles required a provision for depreciation, it had to be taken; if not it did not. As Litherland [1968, p. 171] states, "the question of depreciation was a matter of internal management with which the law had nothing to do. The Articles of the given company were to govern."

We suggest that the reason a general concern with the depreciation for all corporations (and not just railroads) appeared in the U.K. literature in the 1880s and not before is that, prior to 1878, the U.K. tax laws made no allowance for depreciation. "In 1878 the law was modified to permit the deduction of a reasonable amount for the diminished value of machinery and plant resulting from wear and tear. Depreciation was not mentioned in the law and no amount was permitted for obsolescence" [Saliers, 1939, p. 255]. Now there was an additional reason for arguing over the concept of annual depreciation and its level—taxes [Leake, 1912, p. 180].

The income tax explanation for the late nineteenth century depreciation debate also explains the absence of that debate in the U.S. Brief's hypothesis does not. The first effective U.S. corporate income tax law was the Excise Tax Act of 1909 (which went into effect before it was delared unconstitutional).[57] Thus, in 1880 there was no federal tax motivation driving a debate over depreciation. There was in the U.S. in 1880 the problem of determining "profits available for dividends."

The tax laws affected not only the timing of depreciation discussions, but also the resulting concepts of depreciation and of accounting income. In the legal cases on "dividends out of profits," depreciation was regarded as a valuation procedure (see p. 278). Whether the amount of depreciation taken was sufficient would be decided in the event of a dispute. Administering the tax laws is less costly if the periodic valuation is replaced by an arbitrary proportion of historical cost. This saving was recognized in the early literature [Matheson, 1893, p. 15] and was the likely reason that both U.S. and U.K. income tax allowances for depreciation were based on historical cost. The demand for a rationalization of this procedure and other accruals under the tax law eventually resulted in the concept of income based on matching and the realization concept. Storey [1959, p. 232] reports this effect of the tax law as follows:

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[57] An increase in the effective corporate tax rate from less than 1 percent in 1909 to over 7 percent in 1918 further stimulated the concern for depreciation in the U.S. (Source: *Historical Survey of the United States*, U.S. Department of Commerce [1975, p. 1109]).

> [The realization concept] probably did not exist at all before the First World War, and at least one writer states that the first official statement of the concept was made in 1932 in the correspondence between the Special Committee on Cooperation with Stock Exchanges of the American Institute of Accountants and the Stock List Committee of the New York Stock Exchange. The letter referred to rejects the method of determining income by the inventorying of assets at the beginning and end of each period in favor of the recognition of profit at the time of sale. This concept of profit was gradually taking form during the period after the First World War and had become dominant in the field of accounting determination of net income by the late 1930's. *That it was influenced by the concept of income laid down by the Supreme Court in early income tax litigation is obvious* (emphasis added).

The timing of the depreciation debates in the U.K. also appears to confirm our hypothesis that political action caused the observed change in accounting theory. The tax allowance of the depreciation deduction (1878) *precedes* the 1880s debates.

It might appear that the development of the profession could explain the difference in the timing of the concern with depreciation in the U.K. and U.S. The professional bodies did not really develop until the 1870s in the U.K. and until the 1890s in the U.S. [Edwards, 1968a, pp. 197–199]. Hence, we could not observe depreciation debates in either country until those times. However, this alternative hypothesis is unsatisfactory on several counts. *First*, while the first professional society was not formed in the U.K. until 1854, Littleton [1933, p. 265] reports evidence of individuals (primarily lawyers) practicing accounting in the U.K. in the eighteenth century and suggests it is highly likely that accounting was practiced by lawyers in earlier times also. Similarly, there were public accountants in the U.S. at least as early as 1866 [Edwards, 1968a, p. 198]. *Second*, the lack of a *formal* accounting profession did not prevent the appearance of the railroad depreciation literature in both the U.S. and U.K. in the 1840s and 1850s. *Third*, the formation of professional societies, itself, is likely to be due, at least partly, to political action. Accountants have incentives to lobby on government prescription of accounting practices. Given some economies of scale in lobbying, government intervention in accounting would be expected to produce professional bodies.

C. Securities Acts

There appear to be at least two major effects of the U.S. Securities Acts of 1933–34 on the accounting literature: they caused the objective of accounting to shift to what we call the "information objective"; and they stimulated a search for accounting principles. Both *follow* the Securities Acts.

(1) *The Information Objective.* Prior to the Securities Acts accounting theo-

rists tended to describe and base their prescriptions on the multiple objectives of accounting, and they listed the numerous users. Consistent with our analysis of accounting in an unregulated economy, the control, or stewardship role, was frequently stressed. For example, Leake [1912, pp. 1–2] includes as reasons for calculating profit and loss:

1. the stewardship role of management to "uphold the value of the capital investment and to ascertain and distribute the annual profits with due regard to the differential rights" of the various classes of capital;
2. profit sharing schemes between capital and labor;
3. income taxes; and
4. public utility regulation.

Daines [1929, p. 94] describes the "orthodox" or dominant objective of accounting as being "to reflect that income which is legally available for dividends." Sweeney [1936, p. 248] states that "the fundamental purpose of accounting should consist of an attempt to distinguish between capital and income."

In his book based on his doctoral dissertation, Sweeney adds other functions to the stewardship role:

> Business management guides the affairs of business. For its own guidance it depends heavily on reports submitted to it by its employees. Periodically it renders reports of its stewardship to the owners of the business. From time to time it also renders reports to bankers who have lent money to the business, to federal and state governments that tax or regulate business, and to the general financial public.
>
> The whole system of business, therefore, depends upon reports. Reports are made up largely of accounting statements [Sweeney, 1936, p. xi].

Managers were frequently cited as important users of accounting. Paton [1924, p. 1] defines accounting as a

> mechanism and body of principles by means of which the financial data of the particular concern are recorded, classified, and periodically presented and interpreted, with a view, thereby, to the *rational administration of the enterprise* (emphasis added).

After the Securities Acts the providing of information to investors and creditors in order to aid them in making rational investment choices became the dominant objective in the literature. We call this the information objective. One of the earliest documents which illustrates this new emphasis on the investor's decision is the AAA's 1936 "Tentative Statement on Accounting Principles." A number of "unsatisfactory" accounting procedures are discussed, including upward asset revaluations:

> Occasional uncoordinated "appraisals" produce in the average financial statement a hodgepodge of unrelated values of no explicable significance to *the ordinary investor*, if indeed they have any to the managements of the enterprises affected [American Accounting Association, 1936, p. 189] (emphasis added).

Notice the emphasis given to investors. Hendriksen [1977, p. 54] also supports our contention that the objective changed "from presenting financial information to management and creditors to that of providing financial information to investors and stockholders." In a more recent example, *A Statement of Basic Accounting Theory* [American Accounting Association, 1966, p. 4], the information objective is listed first among four objectives of accounting. The objectives are:

1. to provide information for decisions concerning limited resources by "individuals acting in their own behalf, such as the stockholders or creditors of a firm, by agents serving in fiduciary capacities, or by indi-

viduals or groups in business firms, in government, in not-for-profit organizations and elsewhere" [p. 4].
2. to effectively direct and control an organization's human and material resources,
3. to maintain and report on the custodianship of resources,
4. "to facilitate the operations of an organized society for the welfare of all" [p. 5].

Recent writers no longer even list management as a principal user of financial statements. The dichotomy of internal and external accounting has become complete. The recent statement on accounting objectives, the FASB's Conceptual Framework Study [1976], also excludes management:

> Financial statements of business enterprises should provide information, within the limits of financial accounting, that is useful to present and potential investors and creditors in making rational investment and credit decisions [FASB, 1976, p. 10].

The dominance of the information objective arose, we suspect, as a public interest justification consistent with and in support of the *raison d'être* of the Securities Acts. The SEC was justified in terms of, and charged with, maintaining the orderly functioning of the capital markets. In particular the SEC was to protect the public from another stock market crash. That crash was alleged to have been caused in part by inadequate corporate disclosure, although very little evidence exists to support this claim.[58]

Although the SEC delegated the power to determine accounting standards for corporate disclosure to the accounting profession, there is evidence that it still exercised control over that determination. According to Horngren [1973] and Zeff [1972, pp. 150–160] the SEC managed by exception, threatening to intervene, or actually intervening in the standard-setting process whenever the Committee on Accounting Procedure (CAP) or the APB proposed a standard of which it did not approve. Consequently, proponents advocating particular accounting procedures would justify those procedures in terms of the SEC's stated objective—the public interest (which "requires" the information objective).

The hypothesis that the dominance of the information objective was caused by the Securities Acts is supported not only by the tendency of modern writers to cite the public interest as an objective along with the information objective [*e.g.*, the fourth objective of *A Statement of Basic Accounting Theory* listed above], but by the tendency to argue that fulfillment of the information objective is necessary to the "public interest." An example of that latter tendency is provided by the FASB [1976, p. 3]:

> Financial accounting and reporting is an important source of information on which investment, lending, and related decisions are based. Confidence in financial information is vital not only to ensure that individual decisions result in an equitable allocation of capital but to ensure continuing public support of the free enterprise system as a whole.

The close relationship between the information objective and the "public interest" is exemplified by the argument recently raised in the literature that information provided in accounting reports is a public good and that as a consequence, there may be an underproduction of information from society's viewpoint (*i.e.*, there may be a market failure). If there is a market failure, the argument proceeds, the "public interest" may require disclosure laws requiring the provision of information to investors [Beaver, 1976, p. 66].

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[58] See Benston [1969a and b]. The U.S. Securities and Exchange Commission [1945, pp. 1–3 and Part X] makes this claim, although Sanders [1946, pp. 9–10] disputes much of their argument.

(2) *The Search for Accounting Principles.* Before the Securities Acts most of the accounting literature did not stray far from practice, and prescriptions were usually based on rationalizations of practice (*e.g.*, the matching concept). Even Sweeney's price-level accounting proposals of the 1920s were based on practice. According to the author [Sweeney, 1936, p. xii] the work "has its roots in methods that were developed in Germany and France during the late inflation periods in those countries." There was, with the notable exceptions of Paton [1922] and Canning [1929], little effort devoted to establishing a theory of accounting.[59] Indeed, Chambers [1955a, p. 18] claims that except for Paton [1922] the word theory was not attached to any work in the accounting literature until after World War II.

Taggart describes the general situation in 1922 as follows:

> Some of the writers on theory, notably Sprague and Hatfield, not satisfied merely to describe practice, had earnestly addressed themselves to exposition of pure theory; but the textbook writers, for the most part, had quite naturally concerned themselves primarily with practice and with not much more than an occasional nod toward theory, where it seemed to bolster practice. Paton's *Accounting Theory* is concerned only with theory; it touches on practice only for illustration or contrast; and it is quite the opposite of an apologia for practice, [Foreword in the 1962 re-issue of Paton, 1922, p. v.].

Canning [1929, p. 160] himself wrote, "accountants have no complete philosophical system of thought about income; *nor is there evidence that they have ever greatly felt the need for one*"[60] (emphasis added).

A potential explanation for the two famous departures from the orthodox accounting thought of the 1920s [Canning, 1929; and Paton, 1922] is that both were based on doctoral dissertations written in economics departments [Zeff, 1978, p. 16]. Undoubtedly, both authors were influenced heavily by economists as well as accountants. Canning himself writes, "I need not declare my obligation to Professor [Irving] Fisher for the influence of his writings upon my thought—that obligation appears throughout the whole book" [Canning, 1929, p. iv].

If Paton and Canning were harbingers of a change in accounting thought, we would expect to observe a shift in the orthodox accounting view during the 20s, following publication of their books. Alternatively, if Canning's and Paton's views were outliers or aberrations due to their economics training, we would expect to observe them modifying their views towards the orthodox position to ensure their survival as accounting academics.

Zeff [1978] presents evidence that Paton's views, at least, moved more towards the orthodox view during the 1920s and 1930s, than the orthodox view moved towards Paton's. Thus, it is difficult to argue that Paton and Canning were representative of a change in the accounting literature which influenced the passage of the Securities Acts. Instead, we suspect that much of the attention which Paton's and Canning's views received after the Securities Acts was a result of the Acts themselves.

The literature's concern with practice

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[59] The Federal Reserve Board published a 1917 bulletin (*Uniform Accounting*) written by Price, Waterhouse & Co. in response to the Federal Trade Commission threatening to establish a federal accountant's register, but the bulletin "consisted of mainly audit procedures" [Carey, 1969, pp. 1:129–135].

[60] Canning's principal intentions were not to reform existing practice or to construct a general theory but rather to make "the work of the professional accountant more fully intelligible to those in other branches of learning" [1929, p. iii].

before the Securities Acts is not surprising (given our theory). Prescriptions based on rationalizations of practice are to be expected in an economy in which corporate reporting is not regulated. Theorists would base their prescriptions for individual firms on the current institutional arrangements determining practice (*i.e.*, in the terms of the agency or stewardship relationships, utility regulation, taxes, *etc.*). Hence, theory would be very concerned with practice. Further, because the advantages are to the individual firms, the theorist would not *require* all firms to follow his prescriptions, but expect his prescriptions to be adopted because of self-interest. The theorist would not try to specify accounting principles which all firms *should* adopt.

As we have noted, the Securities Acts were based on the argument that required disclosure is necessary to the "public interest." The idea was that without required disclosure capital markets would be less efficient. We do not observe this theory being generally advanced in the accounting literature prior to the Securities Acts.[61]

The justification for required disclosure is that the private incentives to adopt accounting prescriptions are insufficient. Hence, current accounting practice cannot serve as a basis for prescriptions. This justification sets accounting theory free from practice. It makes it possible to "build up a theory of accounting without reference to the practice of accounting" [Chambers, 1955a, p. 19]. Further, the justification caused the SEC to demand such theories. Because they were to reform existing accounting practice, the SEC commissioners could not base regulations on practice; they required a theory or a set of accounting principles to justify their rulings.

Zeff [1972, pp. 133–173] documents the AICPA's initial search for accounting principles and the SEC's passing the responsibility for the determination of principles to the profession in SEC Accounting Series Release No. 4 [U.S. SEC, ASR 4].[62] Zeff also documents the search for accounting principles (or standards) by the succession of standard-setting bodies established by the profession. As noted, the SEC exercised control over the standard-setting bodies' search for accounting principles. Thus, we expect these bodies (like the SEC) to search for or demand accounting principles which do *not* describe existing practice.

We expect accounting theorists, who are accustomed to developing rules based on practice, to be perplexed by a demand for accounting principles not based on practice. *After* the SEC's call (in ASR 4) for accounting principles for which there is substantial authoritative support [1938], the accounting literature begins to discuss the nature of principles [Scott, 1941; Wilcox and Hassler, 1941; and Kester, 1942].[63] Further, as theorists come to observe less emphasis being placed on the practicality of their approach, we observe philosophical works becoming far removed from practice such as Chambers [1955a, 1955b, 1966],

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[61] The theory does appear in *The Journal of Accountancy* in October, 1930 (see Hoxsey [1930], but the author is not an accounting theorist; instead he is an employee of the New York Stock Exchange. The theory also appears in the writings of Ripley in the popular financial literature in the 1920s (*e.g.*, Ripley [1926]). However, Ripley is also not representative of the financial literature.

[62] ASR 4 stated that "financial statements filed with this Commission . . . [which] are prepared in accordance with accounting principles for which there is *no substantial authoritative support*, . . . will be presumed to be misleading or inaccurate" (emphasis added). ASR 4 created a demand for some procedure or device to provide "substantial authoritative" support.

[63] Storey [1964, p. 3] supports our contention that the Securities Acts were "landmark events" and directly related to the search for accounting principles.

Mattessich [1957] and Edwards and Bell [1961].

It is instructive to compare the search for accounting principles in the U.S. to that in the U.K. where there has not been a government regulatory body with the statutory power to prescribe accounting procedures [Benston, 1976, pp. 14–30; Zeff, 1972, pp. 1–69].[64] Until recently there has been considerably less "progress" in the U.K. in the search for accounting principles [Zeff, 1972, p. 310 and Shackleton, 1977, pp. 17–21] and further, "the English began late" [Zeff, 1972, p. 310]. The evidence suggests that the U.K. search for principles is also a response to government pressure which arose out of various financial crises [Zeff, 1972, pp. 39–40; Benston, 1976, pp. 15–17; and Shackleton, 1977, pp. 17–21].

The difference in the timing of the search for principles in the two countries is reminiscent of the 30-year difference in the timing of the general depreciation debates in the U.K. and the U.S. That 30-year difference also coincides with a difference in the timing of government regulation (*i.e.*, corporate income tax laws allowing depreciation as a deduction). The difference in timing cannot be explained *per se* by the fact that we are comparing two different countries. In the depreciation debates, the U.K. led, while the U.S. led in the search for principles.

The discussion in this section has suggested that much of accounting theory (*e.g.*, the concepts of depreciation, accrual accounting, the application of the concept of economic income, and the idea that the objective of financial statements is generally to provide information to investors rather than to control agency costs), *follows* government intervention. Thus, the evidence is consistent with our hypothesis that much of accounting theory is the product of government intervention and that accounting theory satisfies the demand for excuses. The evidence appears to be inconsistent with what we have called the "public interest" hypothesis. Undoubtedly there are alternative theories which can also explain the timing of the accounting literature. The challenge is to those who would support those alternative theories to specify them and show that they are more consistent with the evidence than ours.

V. CONCLUSIONS

In our view, accounting theories have had an important role in determining the content of financial statements—although it might not be the role envisioned by the theorists. Instead of providing "an underlying framework" for the promulgation of "sound" financial reporting practices by standard-setting boards, accounting theory has proven a useful "tactic to buttress one's preconceived notions" [Zeff, 1974, p. 177]. While accounting theories have always served a justification role in addition to information and pedagogic roles, government intervention has expanded the justification role. The predominant function of accounting theories is now to supply excuses which satisfy the demand created by the political process; consequently accounting theories have become increasingly normative.

We are not offering any judgments on the desirability of accounting theories fulfilling an excuse role. What we are arguing, however, is that *given* the existing economic and political institutions and the incentives of voters, politicians, managers, investors, *etc.* to become involved in the process by which accounting standards are determined, the only accounting theory that will provide a set of predictions that are consistent with observed phenomena is one based on self-interest. No other theory, *no normative theory currently in the accounting literature,* (e.g., *current value theories*) *can explain or will be used to justify all accounting standards*, because:

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[64] See Sanders [1945] for an overview of the different prevailing attitudes in the U.S. and U.K. in the 1940s.

1. accounting standards are justified using the theory (excuse) of the vested interest group which is benefitted by the standard;
2. vested interest groups use different theories (excuses) for different issues; and
3. different vested interest groups prevail on different issues.

While a self-interest theory can explain accounting standards, such a theory will not be used to justify accounting standards because self-interest theories are politically unpalatable. As a consequence, *not only is there no generally accepted accounting theory to justify accounting standards, there will never be one.*

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Technological Changes and Replacement Costs: A Beginning

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ABSTRACT: This article considers the issue of technological changes in a replacement cost accounting system. When such changes occur and the firm continues to utilize the "old" asset, should the replacement cost be measured by reference to the current cost of the old asset actually in use? Or, alternatively, should the replacement cost reflect the cost of the technologically improved asset that is not now being utilized by the firm?

The analysis indicates that the two approaches are economically equivalent in many circumstances. However, while their information content may be identical, various measurement problems exist which tend to make one method preferable to the other under certain conditions. These issues are explored in various market settings.

CONSIDERABLE attention has been directed to replacement cost accounting in the research literature. Despite this attention, the question of how to reflect technological changes in replacement cost systems has been largely ignored. This omission is serious since the formal introduction of current costs into an accounting system immediately raises the question of "what current cost" is appropriate when technological changes have occurred. Should replacement cost reflect the current cost of replacing the *existing* asset now being utilized? Or, alternatively, should replacement cost be measured by reference to the technologically most efficient asset available, even though the firm does not now actually utilize such an asset? Hereafter, for simplicity, we will refer to the replacement cost of the existing technology actually being utilized as the Oldtech Method; the replacement cost of the latest, most advanced technology will be termed the Newtech Method.

One of the principal arguments against the Oldtech Method is that used asset prices may not reflect the effects of technological change. Accordingly, the Newtech Method is thought by some to be necessary in order to incorporate the financial impact of technological changes in replacement cost statements. But use of the Newtech Method leads to the inclusion of "hypothetical" or "as if" asset values, depreciation charges, and cost savings calculations, since accounting under the Newtech Method is based on replacement costs for assets that are not actually owned by the firm. Furthermore, the hypothetical numbers associated with the Newtech Method generates opposition to this method from those who believe that accounting calculations should relate to actual, rather than hypothetical, events. Clearly, this philo-

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sophical issue is central to the controversy regarding the treatment of technological change in replacement cost statements.

This philosophical issue cannot be resolved directly. Positions regarding the role of accounting reports are dependent on the paradigm and subjective preferences of the evaluator; since paradigms and preferences are not "correct" or "incorect", the argument at this level is endless [AAA, 1977]. Furthermore, we cannot utilize normative criteria to reach general conclusions, since insofar as these criteria are divorced from individual preferences, no such criterion will lead to a consistent *general* preference [Demski, 1973].

The analytical approach used in this paper avoids the unresolvable philosophical debate. Instead, it is demonstrated that the accounting signals generated by the Oldtech and Newtech Methods are, in theory, economically equivalent under certain circumstances. Therefore, if information processing costs are identical and there are no externalities, the two alternatives can be evaluated *in restricted settings* using certain criteria like the minimization of expected measurement error.[1] While general conclusions are not possible using such criteria, we will also see that the range of debate frequently can be narrowed by the use of this analytical approach in restricted settings.

FUNDAMENTAL CONSIDERATIONS

Assumptions

To facilitate the analysis, certain assumptions have been adopted in this paper. First, as has been suggested by the Financial Accounting Standards Board, "financial reporting should provide information to help investors and creditors assess the amounts, timing, and uncertainty of prospective net cash inflows to the related enterprise" [FASB, 1977, p. 11]. It is assumed that assessments of future income and operating rate of return are necessary in achieving this objective. Second, the definition of replacement cost is assumed to be deprival value; that is, a "value to the firm" approach is adopted.[2] Third, the discussion of technological improvements is limited to those which result in variable cost savings. Other improvements such as capital savings and changes in product quality are not discussed.

Abandonment Decisions

Technological changes do not necessarily get adopted immediately. Like any other capital budgeting option, the decision to replace old technology with some new improved technology is made on the basis of the differential cash flows that are expected to result from adopting the change. When the annual equivalent net cash inflows from immediate replacement exceed the annual equivalent net cash inflows from replacement at some future date, adoption of the technological change is economically warranted.

This relationship provides an economic explanation for the varying speeds with which different innovations diffuse throughout the economy. When the economic significance of the technological change is great, the likelihood that the differential cash flows for a particular firm will be positive is increased; in turn, large, positive expected differential cash flows increase the speed with which improved technology will be adopted. On the other hand, less significant changes make the expected differential cash flows smaller and reduce the rate of adoption; *i.e.*, when the economic incentive is small, firms may defer replacement until the expiration of the old asset's physical life.

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[1] In essence, we will structure a situation in which the two technological change alternatives are identical on all dimensions except expected measurement error; hence, in this restricted setting, one of the approaches will dominate.

[2] An asset's "value to the firm" will be its current replacement cost unless this replacement cost is greater than both the net realizable value and subjective present value of the asset. In these latter cases, "value to the firm" is the greater of net realizable value or subjective value. See Parker and Harcourt [1969, p. 18].

Viewing innovation adoptions as a capital budgeting decision emphasizes the importance of the problem of accounting for technological changes. This perspective indicates that it is not "irrational" or "inefficient" for firms to continue using old equipment once a technological change has taken place. On the contrary, slow adoption of technological changes should be expected in certain cases thereby increasing the likelihood that the old and new technologies could exist simultaneously among different firms. This, in turn, increases the frequency in which the Oldtech versus Newtech issue arises.

Factor Substitutability

For a firm that has not adopted a particular technological change, the Oldtech Method computes balance sheet and income statement numbers using the market replacement cost for the "old" (technologically inferior) assets actually employed by the firm. This is the treatment that Edwards and Bell recommended [1961, p. 186n; pp. 285–287]. Some critics of the Oldtech Method have argued that this use of current prices for the *old* assets ignores the impact of the technological change on the operations and prospects of the firm. For example, one author [Lemke, 1976, p. 39] maintains:

> If [asset carrying values and depreciation were based on the replacement cost of an identical asset rather than on a technologically improved one] accountants would find themselves incorporating into the accounts the current purchase cost and related depreciation of an obsolete asset that the company has no intention of purchasing—the income figure would represent an obsolete technology not to be continued.

In this same vein [Parker and Harcourt, 1969, p. 19]:

> It is essential therefore to interpret current replacement cost not as the cost of replacing the actual physical asset used by the firm but as the cost of currently acquiring the *services* provided by the asset.

Similar views on the Oldtech Method ignoring (or to some, incorrectly reflecting) technological change have appeared elsewhere [Paton and Paton, 1952, p. 325; Prest, 1969, p. 303; Lemke, 1966, p. 38], and these views were cited (without comment) by the FASB [1976, p. 200]. This position was also strongly expressed at several public meetings of the Securities and Exchange Commission's Advisory Committee on Replacement Cost Implementation.[3] These comments arose during formal discussions to consider whether the Oldtech Method should be permitted in Accounting Series Release No. 190 disclosures. Subsequent interpretations specified that these data be measured using the Newtech Method [SEC, 1976b, para. 1, d]. The assertion that the Oldtech Method ignores technological change prevailed, and this method was explicitly rejected by the SEC except under precisely delineated, narrow circumstances [SEC, 1976b, para. 6, f].

This assertion, however, is clearly at variance with economic theory and available evidence about asset markets. Rather than ignoring technological changes, the prices of technologically inferior assets must fully reflect the impact of such changes in a complete and frictionless market. If this were not the case, "old" assets would be mispriced in a relative sense and the market for these assets would not clear. In other words, after a technological change takes place, the "old" and "new" assets are substitutes for one another.[4] For example, in a manufacturing setting, the "old" and "new" assets may each provide a different technology for creating an identical final product; however, the "new" technology may be more efficient. When the introduction of a new machine changes the cost of production, the price of the old-technology assets must adjust. This adjustment arises because the cross-elasticity of demand between old and new assets devoted to a similar use is greater than zero.

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[3] Meetings of the Advisory Committee on Replacement Cost Implementation, May 18, 1976 and June 29, 1976, Washington, D.C.

More precisely, let:

G_o = marginal physical product of the old asset
G_n = marginal physical product of the new asset
P_o = price of the old asset
P_n = price of the new asset.

Then in equilibrium, the following relation[5] must hold:

$$\frac{P_o}{G_o} = \frac{P_n}{G_n} \tag{1}$$

To illustrate why, let us assume that the relation in Equation (1) does not hold across all firms immediately after the introduction of the new more efficient asset. Specifically, assume that the price for old assets does not initially change; thus

$$\frac{P_o}{G_o} > \frac{P_n}{G_n}.$$

This relative mispricing sets certain market forces into motion which continue until each firm is able to restore the relation specified in Equation (1). Specifically, the technological change will shift the entire demand schedule for old assets to the left. *Ceteris paribus*, this shift in demand will cause firms to reduce their utilization of the old asset and simultaneously cause P_o to fall. Because of the principle of diminishing marginal returns, this reduced utilization of the one factor in the short run will cause G_o to increase. These adjustments in price and utilization of the old asset will stop only when prices have fallen sufficiently to allow each firm to employ the asset in accordance with the relation in Equation (1). Once this adjustment takes place, it is clear that the old asset price will fully reflect the technological change.[6]

Furthermore, if there are no size or other barriers to entry, and if the assets involved are perfect substitutes and all

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[4] As an illustrative case, see Gumpert [1974, p. 24]. Green and Sorter [1959] referred to the substitutability case as "partial obsolescence." Their proposal for accounting for partial obsolescence was probably the first to develop the Oldtech Method in the accounting literature.

[5] This is equivalent to saying that the marginal costs of the two assets must be equated. To illustrate, let

$$G_o = \frac{\Delta x}{\Delta D_o} \quad \text{and} \quad G_o = \frac{\Delta x}{\Delta D_n},$$

where Δx = change in output of final product, and ΔD_0 and ΔD_n = change in the proportionate utilization rate of the old and new assets, respectively. Then, by substitution into Equation (1):

$$\frac{(P_o)(\Delta D_o)}{\Delta x} = \frac{P_n(\Delta D_n)}{\Delta x} \tag{1'}$$

Since each side of the equation represents a marginal cost, Equation (1) is equivalent to equating marginal costs.

[6] Solomons [1962] reaches a similar conclusion using a somewhat different type of analysis. Green and Sorter [1959] used this relationship between the old and new assets as the basis for their partial-obsolescence adjustment to the carrying value of the old asset, although they did not assume that old asset prices would necessarily adjust in this manner. This price relationship has also been utilized previously in a replacement cost setting. For example, it is implicit in a prior study of the predictive ability of replacement costing during periods of technological change [Revsine, 1973, pp. 154–162] and in a development of functional pricing [Weil, 1976].

assets are perfectly divisible, then the actions of each firm in striving to achieve the Equation (1) relationship for its own production process implies still another relationship. Specifically, when a firm has adjusted its utilization of assets in order to establish the equality reflected in Equation (1), then the prospective rate of return on each asset is also identical. Economists have cited this adjustment process as being one of the reasons why oligopolistic industries have tended to resist certain technological changes. Since most new processes will eventually be adopted by competitors, the rate of return for an innovating firm may be no higher once an innovation has been widely adopted; *i.e.*, rates of return will tend to be equalized.[7] However, where there are entry barriers and/or limitations on substitutability and divisibility, then prospective rates of return will probably differ. Accounting for technological changes when such frictions exist will be discussed in a later section. In the immediately following section, we assume that frictions inhibiting asset mobility are totally absent.

THE OPTIONS ILLUSTRATED

Frictionless Markets

A simple example will show how the two approaches for reflecting technological change differ. Assume that a firm has just purchased an asset on December 31, 19×0. This asset cost $6,000, has a three-year life, no salvage value, and promises to generate annual net cash operating flows of $2,412.74. This is equivalent to a 10 percent internal rate of return.

Further assume that on January 1, 19×1, a new improved asset is introduced. This technologically improved new asset is material-saving; the same level of final output is manufactured using a smaller amount of variable input. A portion of this saving is passed on to consumers in the form of a lower selling price for the final product. The combined net effect of greater input efficiency and lower selling price raises the expected net cash operating inflows from $2,412.74 to $2,493.16 per year for adopters of the new technology. If we further assume that the equilibrium return remains at 10 percent, the price of the technologically improved new machine is $6,200.

Since the technological change has caused a fall in the selling price of final output, users of the *old* asset will find themselves selling the previous quantity of output at a lower price. Assume that this lower level of net cash operating inflows is $2,332.31 per year. Recall that the price of the old machine was $6,000. This price must now adjust since, at the old $6,000 price, the expected return is below the 10 percent return promised by the technologically improved substitute asset. Consistent with the adjustment process in complete and frictionless markets, we assume that the adjusted price for the old asset equates the prospective return on the old asset with the 10 percent prospective return on the new asset. Using these assumptions, the market price of an old asset with a three-year remaining life will fall to $5,800; this is the present value of the expected net operating flows of $2,332.31 per year discounted at a 10 percent rate.

We will now compute income on both the Oldtech and Newtech Methods for the three years of the asset's life. Since the relationship between the two methods is most easily seen when present-value depreciation is used, the example will employ that depreciation method, despite its virtual neglect in actual practice. Table 1 illustrates the Oldtech computa-

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[7] For a discussion of this point, see Blair [1972, pp. 232–233].

TABLE 1

OLDTECH METHOD

Depreciation Computation ("old" asset)	19×1	19×2	19×3
Book value at start of year* (1/1/×1 price minus accumulated depreciation)	$5800.00	$4047.69	$2120.15
Expected net cash operating inflows	$2332.31	$2332.31	$2332.31
Income (10% of beginning-of-period book value)	580.00	404.77	212.16†
Present value depreciation	$1752.31	$1927.54	$2120.15
Income Statement:			
Realized net cash operating inflows	$2332.31	$2332.31	$2332.31
Depreciation (as above)	(1752.31)	(1927.54)	(2120.15)
Net operating income	$ 580.00	$ 404.77	$ 212.16
Operating rate of return on beginning-of-period book value	$\frac{580.00}{5800.00}=10\%$	$\frac{404.77}{4047.69}=10\%$	$\frac{212.16}{2120.15}=10\%$†
Holding gain (loss)	(200)	—	—
Total replacement cost rate of return on book value	$\frac{380.00}{5800.00}=6.5\%$	$\frac{404.77}{4047.69}=10\%$	$\frac{212.16}{2120.15}=10\%$†

* If we assume a perfect, frictionless market for productive assets, this book value would be equal to the actual market value.

† Rounding error.

tion of both present value depreciation and net income for the firm that bought the "old" asset on December 31, 19×0. Since the firm actually utilizes the "old" asset, the Oldtech Method computes the financial statement numbers by reference to the operating performance of the existing technology currently in use, *i.e.*, the "old" asset. For simplicity, we assume that the operating inflows anticipated on January 1, 19×1 (*i.e.*, immediately after the introduction of the technologically improved new asset) are equal to the realized cash inflows in each period.

In this straightforward case where actual cash inflows equal anticipated inflows, the reported period-by-period operating return on the start-of-period asset book value is always 10 percent, the equilibrium return. (Following the assumption made at the start of the paper, we focus on the operating return, since this is assumed to be consistent with the FASB's emerging emphasis on providing information regarding prospective long-run cash inflows.)

Next we will compute present-value depreciation and net income for this same firm using the Newtech Method, as defined by the SEC. The SEC mandated a supplemental disclosure approach. In adopting the Newtech Method, ASR No. 190 required firms to disclose the asset carrying values, depreciation, and (in certain circumstances) cost savings that would exist if the new technology were

TABLE 2

NEWTECH METHOD

Depreciation Computation ("new" asset)	19 × 1	19 × 2	19 × 3
Book value at start of year* (1/1/× 1 price minus accumulated depreciation)	$6,200.00	$4,326.84	$2,266.36
Expected cash inflows from new asset	2,493.16	2,493.16	2,493.16
Income (10% of beginning-of-period book value)	620.00	432.68	226.80†
Present Value Depreciation	1,873.16	2,060.48	2,266.36
Income Statement:			
Realized net cash operating inflows—"old" asset	$2,332.31	$2,332.31	$2,332.31
Cost savings that would arise from using "new" asset	160.85	160.85	160.85
	$2,493.16	$2,493.16	$2,493.16
Depreciation (as above)	(1,873.16)	(2,060.48)	(2,266.36)
Net operating income	$ 620.00	$ 432.68	$ 226.80
Operating rate of return on beginning-of-period book value	$\frac{\$620.00}{6200.00}=10\%$	$\frac{\$432.68}{4326.84}=10\%$	$\frac{\$226.80}{2266.36}=10\%$†
Operating return after "wash entries" for depreciation and cost savings are eliminated and after subtracting asset offset (See Appendix)	$\frac{620-160.85+120.85}{6200-400}=10\%$‡	$\frac{432.68-160.85+132.94}{6200-400-1752.31}=10\%$	$\frac{226.80-160.85+146.21}{6200-400-1752.31-1927.54}=10\%$†

† Rounding error.

* If we assume a perfect, frictionless market for productive assets, this book value would be equal to the actual market value.

‡ The 19 × 1 return computation does not include the numerator effect of the "holding loss" since the debit for this item is treated as a direct offset to equity. This is consistent with the SEC's reluctance to treat holding gains or losses as income statement items.

utilized. Complete replacement cost statements were not required.[8] For this reason, our analysis concentrates on the numbers that can be derived directly from the partial SEC disclosures, especially the operating return.

Table 2 shows the results for the Newtech Method using the piecemeal approach mandated by the SEC. Certain of these numbers are measured by reference to the "new" asset, despite the fact that the firm actually utilizes the "old" asset in its operations.

As an example, operating cost savings must be incorporated explicitly into the computations under the Newtech

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[8] Surprisingly, there is little in the literature describing complete replacement cost statements using the Newtech Method. Since the SEC did not specify how such statements should be prepared, we are forced to "invent" illustrative journal entries in the Appendix. *This should not, however, be interpreted as an endorsement of the Newtech Method.*

Method. The reason is that the firm is actually using the "old", inefficient asset and recognizing that asset's lower cash inflows; however, the depreciation deduction is based on the "new", efficient asset. This doubly penalizes the non-adopting firm; *i.e.*, it includes the inefficiencies of the old asset in the cost of goods sold number and includes the higher cost of the efficient machine in the depreciation number.[9] In order to make the two computations consistent, cost savings that would arise if the new technology were actually utilized are added back to the actual cash operating inflows.[10]

Tables 1 and 2 do show that the absolute size of the balance sheet and income statement numbers generated by the Oldtech versus Newtech Methods indeed differ. These differences are probably what motivated some observers to discriminate between the options and favor one over the other. But clearly, absolute numbers do not tell the whole story. Tables 1 and 2 also show that the percentage *operating* rate of return is the same on each basis, and, when present value depreciation is utilized, is equal to the internal rate of return generated by each asset.[11] In other words, both options reflect the same underlying operating rate of return. Furthermore, this rate-of-return equivalence will always exist so long as the underlying technologies are appropriately priced in a relative sense. If each firm strives to utilize the respective technologies in accordance with the relation in Equation (1), their collective action will essentially equilibrate the rates of return in complete and frictionless competitive markets. This equilibration, in turn, means that in such markets, the Oldtech and Newtech Methods will also reflect the underlying operating rate of return equivalence.[12]

These computations demonstrate that in complete and frictionless markets the Oldtech Method clearly does *not* ignore the effects of technological change.[13] This, of course, is somewhat contrary to many previous literature references on this subject. Indeed, the two options generate equivalent results on an operating rate-of-return basis. This equivalence, in turn, reflects the underlying relationship that must exist under competitive equilibrium conditions for substitute inputs. Thus, in complete and frictionless input markets during periods of technological change, replacement cost systems will generate essentially equivalent percentage results whether the market price of existing assets is utilized or whether the market price of new assets is utilized in conjunction with associated opportunity cost savings.

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[9] This "double penalty" approach represents the method adopted in the Sandilands Report. In that approach, non-current assets (other than land and buildings) are measured for balance sheet purposes by taking their original cost and adjusting this cost by an industry index that purports to represent changes in the price of assets utilized by that industry. [Inflation Accounting Committee, 1975, pp. 172–175] Despite efforts to isolate the price effects of technological change in constructing such indexes, these attempts are not always successful. Since the index is applied to all assets, old assets that have not experienced the technological change will also be written up. Insofar as the price effects of technological change have not been completely eliminated, this would increase the depreciation charge unduly and lead to an inconsistency between the technological basis presumed in computing cost of goods sold and depreciation. For an excellent discussion of this point, see Lemke [1976].

[10] This is the approach adopted by the SEC [1976c, para. 1, e]. However, the Commission permits these cost savings to be offset against the required cost of goods sold disclosure only if they are "reasonably assured and quantifiable within reasonable limits." Otherwise, only the potential existence of the estimated savings can be disclosed, and the primary cost of goods sold and depreciation disclosures will incorporate the inconsistency between the technological bases.

An alternative means for eliminating the "double penalty" is proposed by the U.K.'s Accounting Standards Committee [1976]. In this approach, the present value of the estimated cost savings would be deducted from the index-determined "cost" of the old asset. This deduction would presumably make the periodic depreciation charges consistent with the technological basis that is assumed in the cost of goods sold computation.

While the effect of this proposal is similar to the SEC's cost savings approach, the adjustment technique in Exposure Draft No. 18 is specifically prohibited by the Commission [SEC, 1976, para. 1, e].

[11] If straight-line depreciation were used in this case, the rates of return on each basis would change from year to year, but would, in any given year, still be the same for both the Oldtech and Newtech Options. The rates would be: 19 × 1, 6.88%; 19 × 2, 10.32%; and 19 × 3, 20.64%.

[12] Notice that the Oldtech Method's total replacement cost return (after holding losses) is below 10 percent in 19 × 1. In this case, the holding loss reflects the negative impact of the technological change on the future net cash operating inflows of firms utilizing old assets. Whether holding losses induced by technological changes always co-vary with expected future operating flow changes is discussed in Revsine [1973, pp. 154–162].

[13] A related conclusion was reached in a previous study that evaluated the theoretical predictive ability of replacement cost systems during periods of technological

Availability of Asset Prices

The technological change controversy in replacement cost statements relates to the philosophy of the resultant statements; *i.e.*, should the statements incorporate "hypothetical" technology (Newtech) or the technology actually being utilized by the firm (Oldtech)? The previous analysis indicated that in certain simplified situations, the signals generated by each option are economically equivalent. This characteristic may be used, therefore, to avoid an irresolvable philosophical debate and make some tentative policy recommendations in selected situations.

For example, having established the economic equivalence of the accounting signals in a given situation, if we assume further that there are no differences in information-gathering or processing costs between the Oldtech and Newtech Methods, then the criterion of measurement error minimization can be used to narrow the range of debate. In other words, if the two options are similar in all respects but one, then that one divergent dimension may be utilized as the choice criterion in restricted settings.

In utilizing this analytic approach, the critical consideration is the degree to which market prices for "old", used assets are available. Used asset markets are surprisingly well developed for many types of industrial equipment and machinery. Numerous dealers and well-organized informal markets exist for a wide range of general purpose manufacturing components and for many more specialized items where the demand is sufficiently deep. Thus, market prices for the "old" assets currently in use will frequently be available by reference to used equipment dealers' price lists and similar sources.[14]

When market-determined prices for used assets are available, then the numbers required to operationalize the Oldtech Method appear to be more readily determinable and thus subject to less measurement error (*i.e.*, misstatement of the underlying economic return). The reason is that the Oldtech Method requires only operating flow and depreciation data that would be easily obtainable by reference to available used asset price sources. But the Newtech Method necessitates, in addition to operating flow and depreciation data, computations of the cost savings that would accrue *if* the new technology were actually implemented in the organization now utilizing the old technology. Clearly, these cost savings numbers are not readily available from known market sources; instead, they are "as if" numbers that must be computed individually in each specific setting. This use of the Newtech Method introduces the need for estimates and approximations that are unnecessary when the

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change. See Revsine [1973, pp. 154–162]. Weil [1976, pp. 100–101] also recognized this point and briefly outlined certain implications in a functional pricing setting.

[14] For example, used asset prices were readily available for approximately 60 percent of the book value of equipment for a test company in a study sponsored by the American Institute of Certified Public Accountants. See McKeown [1974], and Revsine, [1974].

Oldtech Method is used. In other words, the possibilities for measurement error are greater using the Newtech Method in these circumstances.

Further measurement error possibilities exist under the Newtech Method when the capacity of the "new" technology is greater than that of the "old." This capacity differential requires that the balance sheet replacement cost, depreciation, and cost savings numbers on the Newtech Method be scaled down in proportion to the smaller capacity represented by the "old" asset. This scaling is difficult to do,[15] and it seems much simpler to avoid all of these difficulties by utilizing the readily available used asset prices which obviously require no scaling since these prices relate to the actual assets being utilized. Indeed, the estimates necessary under the Newtech Option probably constitute one of the primary causes for the subjectivity criticisms directed against the SEC-mandated replacement cost disclosures.[16]

On the other hand, when market-generated actual prices for used assets are not readily determinable, the Oldtech Method also becomes difficult to operationalize. To do so requires estimates of the replacement cost of technologically inferior assets in their current condition. When market-determined prices are unavailable, estimates of these prices must be developed in various ways. But these estimates are subject to much imprecision and consequently introduce the possibility for measurement error. For example, one method for approximating the missing used asset price is to index-adjust the original historical cost. These indexes are constructed by reference to the prices of new, replacement assets. But replacement assets are usually technologically improved, and the new asset price often includes a portion attributable to this improvement. Clearly, however, no part of the technological change applies to the old asset, and any price effects arising from technological change should be excluded from the index used in applying the Oldtech Method.[17] To do this, it becomes necessary to estimate the price effects of the technological change and eliminate this effect from the index-adjusted original cost.[18] While the compilers of U.S. Government indexes strive to make such adjustments, it is generally believed that technological and other types of quality change "imparts more error into price measurement than does any other single source" [Triplett, 1975, p. 30].

To summarize, it is clear that, in theory at least, both technological change methods can generate equivalent economic signals. But when the criterion of minimizing measurement error is introduced, choices between the two options sometimes become possible. These choices depend upon the availability of actual market prices for the old technology assets currently in use. When market-determined used asset prices are indeed available, expected absolute measurement error appear to be smaller under the Oldtech Method, and this would become the preferred option using this criterion. However, this advantage disappears when market-determined used asset prices are not available. In these circumstances, non-market based estimates are necessary under either approach whenever a firm continues to employ the old technology. As before, the Newtech Method would require capacity scaling computations and estimates of cost savings, while the Oldtech Method would require estimates of that portion of the total index-determined price change which is attributable to technological improvement. Thus, neither method dominates using the measurement error criterion when there are no actual market prices for used assets.

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[15] Because of the problems of implementing the Newtech Option when there are capacity differences, the SEC has been forced to invent an extremely detailed series of rules to determine the conditions under which "new" asset costs must be scaled. Furthermore, if conditions require scaling for capacity differences, then additional rules for determining the type of scaling (*i.e.*, linear versus non-linear) are also necessary. See SEC [1976d, para. 6, k].

[16] For a survey of corporate disclosures and caveats in this area, see Arthur Andersen & Co. [1977].

[17] The failure to do this constitutes one of the alleged deficiencies of the Inflation Accounting Committee report [1975]. See footnote 9 above.

[18] This approach is recommended by the U.K.'s Accounting Standards Committee [1976]. See footnote 10 above.

MARKET FRICTIONS—RATE-OF-RETURN DIFFERENCES

Analyzing the alternative technological change options in complete and frictionless markets is instructive since it highlights the underlying equivalence of the Oldtech and Newtech methods under ideal conditions. This is helpful insofar as it clarifies previous misunderstandings that have appeared in the academic literature. As such, this approach provides a simplified framework for clarifying a long-standing debate. In such settings, the Oldtech Method generates numbers that reflect the replacement cost rate of return from utilizing the *old* technology. The Newtech Method indicates the return that would exist if the *new* technology were employed. Where the rates of return on both the old and new technology are equal, each method will obviously reflect the same rate of return. For this reason, the choice between the methods hinges on factors like the availability of objective data for implementation, rather than on (nonexistent) differences in the reported return.

Clearly, however, complete and frictionless markets do not invariably exist in practice. For this reason, it is unrealistic to limit the analysis to such economic settings, since there will also be circumstances in which the prospective rates of return on the old versus the new technology will not be identical. In these situations, the two options will generate different replacement cost numbers in both absolute and relative terms, and the choice is thus potentially more significant.

In this section, we examine situations in which the prospective returns are not identical. Five potential causes for differential *ex ante* returns are discussed: 1) entry restrictions, 2) snob effects, 3) multiple-use assets, 4) quality uncertainty, and 5) replacement unjustified.

Entry restrictions. One cause for differences in the prospective rate of return from employing the new versus the old technology is the existence of various entry restrictions. For example, the new technology may require a scale of operation that is beyond the capabilities of some of the smaller firms. This entry restriction may tend to perpetuate return differences. Alternatively, the innovation may originate from one of the producers of final output (rather than from the capital goods industry), and this producer may capture all of the return benefits of the technological change via patent entry restrictions. This would transform the innovator into a quasi-monopolist or at a minimum provide the innovator with a lasting cost advantage. Indeed, consistent with Kamien and Schwartz [1970], these monopoly utilization possibilities increase the incentive to invent and increase the likelihood of these rate of return differentials where such conditions exist.

In these situations, the choice between the Oldtech and Newtech Methods is straightforward. The entry restrictions preclude firms now utilizing the old technology from switching to the new technology. Therefore, were the Newtech Method employed, the resultant financial statements would depict a rate of return that is actually unattainable by those firms. In short, where rate of return differentials exist because of entry restrictions, only the lower return from the old technology is attainable by the restricted firms, and only the Oldtech Method is appropriate.

Snob effects. There are plausible circumstances in which the prospective return on the old technology may actually exceed the prospective return on the new technology. Nevertheless, some producers may deem it to be important from a marketing perspective to employ the latest available technology.[19] When this "snob effect" is widespread, prospective purchasers may actually have to be induced to buy the old technology. Market forces will automatically precipitate the adjustment. That is, if the "snob effect" exists, the market for old assets will not clear at a price which equilibrates prospective returns on the old versus the new assets. This excess will induce price reductions until a new, higher prospective return from employing the old asset at the lower price is sufficient to clear the market.

When a firm continues to utilize an old asset under these conditions, it indicates one of two things: either the firm is impervious to the snob effect or the return differential is sufficient to induce utilization despite this effect. Both of these interpretations seem to favor the use of the Oldtech Method.

On the other hand, the return differential might be specious. This could arise when the snob effect actually carries over into consumer behavior, but the incremental sales from using the new technology are too difficult to estimate. If consumers prefer to deal with firms that employ new technology, then the incremental sales that may arise from switching to the new technology ought to be estimated and included in the Newtech computations. Since it often will be difficult to make these estimates, the Newtech Method could depict erroneous data regarding the underlying operating rate-of-return.[20]

Multiple-use assets. Another situation exists in which the old and new technologies may promise different returns. For example, consider a case where the old technology is special purpose-equipment suited only to Industry A, while the new technology is potentially usable by several other industries in addition to Industry A. If these other industries possess higher risk and are the dominant users of the new asset, the asset's price may be low enough to afford these other industries the higher risk-adjusted return that they seek to achieve; at this low price, the prospective return on the new technology may be higher than on the old technology for Industry A. Furthermore, if these assets are not perfectly divisible, this rate-of-return difference on the two assets might persist for some period.[21]

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[19] For example, Gumpert [1974], cites a case where a bank "wanted the reputation of having the most up-to-date equipment" and actually paid a large premium to buy a new technology computer when an old model with substantially similar capabilities for the bank's intended use was available at a much lower price.

[20] Notice that this revenue omission might extend beyond "snob effect" cases. This raises the possibility that Newtech Method computations could necessitate adjustments for omitted revenues in addition to the previously discussed cost savings. In addition to "snob effect" cases, revenue omissions might arise, for example, when the technological change discernibly alters the characteristics of final output and this alteration changes the expected total revenues from those currently received from the old technology.

[21] This case raises many questions since it implies temporary disequilibrium. In theory, of course, the prospective return differential eventually should drive down the price of the old technology assets and make the Oldtech rate-of-return equal to the Newtech return. Nevertheless, this case has been included for completeness since there may be institutionally specific frictions that inhibit equalization of returns in particular cases.

When these types of return differentials exist between old and new assets, which technological change option should be used in a replacement cost system?

There appears to be no definitive basis for choosing between the Oldtech and Newtech Methods in this case. Each option can be supported. For example, one view is that accounting should depict existing economic circumstances and not make assumptions about future asset acqusitions. Those who subscribe to this view undoubtedly will argue for the Oldtech Method, since this method depicts the return from the assets actually being utilized.

Another view is that when prospective returns differ, the existing return on the old assets is transitory. Under this view, the long-run return that will exist when replacement actually takes place should be reflected. This view is consistent with the Newtech Method. It is interesting to note, however, that in this case the Newtech Method could report a higher return than the Oldtech Method. While this is not a general result for these situations, it does underscore the fallacy inherent in the "conventional wisdom" arguments against the Oldtech Method. That is, the Oldtech Method not only incorporates the effects of technological change, but it also could sometimes lead to *lower* reported returns than the Newtech Method.

Quality uncertainty. Different prospective returns may exist for the old versus the new technology assets because of an asymmetry in available information. This perspective was first developed by Akerlof [1970] and is generally referred to as the "quality uncertainty problem." Since buyers do not have sufficient information to differentiate among assets on the basis of quality, both "good" and "bad" assets may tend to sell at the same price because of sellers' (mis)representations. For this reason, "good" used asset prices may not be commensurate with their quality and thus rates of return may not be equalized across old and new technology assets.

This situation is similar to the multiple-use assets case, immediately preceding, in the sense that no clear preference between Oldtech and Newtech emerges. The issue can be decided only by appealing to subjective preferences based upon individual feelings towards the question of including hypothetical assets in financial statements versus limiting statement data to assets actually owned.[22]

A more extreme result of quality uncertainty is that the market for used assets may cease to exist entirely. In cases where the market for the old assets is nonexistent, neither method dominates. Measurement errors under the Oldtech Method would arise from index adjustments or other methods for trying to estimate the non-existent Oldtech price; measurement errors under Newtech Method would arise from cost savings and capacity scaling estimates.

Replacement Unjustified. Whenever replacement of the existing asset is economically unjustified, prospective rates of return on the old and the new assets will obviously differ. Replacement may be unjustified because an extreme technological change may profoundly alter the production process or final product characteristics. Continued utilization of assets in place may be warranted under these circumstances; however, acquisition and set-up costs may be so high in relation to the inflows that the market for used assets would be destroyed.

In this situation, the relevance of the Oldtech replacement cost has frequently been challenged in the literature. The challenge usually takes the form that some (usually unspecified) normative reporting criterion would be violated if the Oldtech price were used. Indeed, this is precisely the argument that appears to be the primary motivation for certain Newtech proposals. Parker and Harcourt [1969, pp. 17–19], provide one example.

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[22] It should be pointed out that the existence of product guarantees tend to counteract this aspect of quality uncertainty. Such guarantees are commonly offered by dealers in certain types of used industrial equipment. When guarantees are available, this aspect of quality uncertainty is reduced and return differentials may disappear.

It is important to understand that Oldtech and Newtech are not necessarily exhaustive alternatives. The potential inappropriateness of Oldtech costs in certain circumstances does not necessarily justify the use of Newtech costs. That is, a third option—*e.g.*, the higher of net realizable value or present value—may be preferable to both Oldtech and Newtech in these situations. In other words, in cases where replacement is unjustified, it is the use of replacement cost in any form that is under debate rather than the selection of a particular replacement cost like Oldtech or Newtech.

CONCLUSIONS

Analysis indicates that the two technological change options are economically equivalent under many circumstances. Specifically, where market forces act to equilibrate the *ex ante* return on old and new assets, the Oldtech and Newtech methods will lead to identical accounting numbers *on a rate-of-return criterion.* Thus, in the absence of measurement errors, either method can portray accurately the effects of technological change in a replacement cost system.

However, various measurement problems exist which tend to make one method preferable to the other under certain conditions. For example, the Newtech Method requires cost savings estimates and—where the capacities of the old and new assets differ—scaling computations. Since there are no market determined numbers on which to base these adjustments, the Newtech Method necessitates subjective estimates. Because of these estimates, the Newtech Method can introduce measurement errors that misstate the underlying economic return. Accordingly, the Oldtech Method is preferable using an expected absolute measurement error criterion *whenever market-determined used asset prices are available.* Under these circumstances, the Oldtech Method would reflect the same economic return that would ideally be shown under the Newtech Method except that the need for subjective costs savings and scaling estimates would be avoided. However, if market-determined used asset prices were not available, subjective estimates would be required under either method, and no clear preference emerges.

Where there are differences in the *ex ante* return on the old and new assets, each method will generate different results even in the absence of measurement error problems. Five potential causes for differential returns were reviewed. In the first—entry restrictions—and in the second—snob effects—the Oldtech Method is preferable. In the third—multiple-use assets—and in the fourth—quality uncertainty—no clear advantage accrues to either method. Finally, in the case of the fifth potential cause for divergent returns—replacement unjustified—the use of replacement cost itself is at issue, rather than whether that replacement cost should be measured on the Oldtech or Newtech basis.

APPENDIX

Since the SEC did not specify how the Newtech Method would be depicted in a comprehensive set of replacement cost statements, certain accounting issues remain unclear. To illustrate, consider the Newtech asset value at the start of 19 × 1 in the example discussed in the body of the paper. The SEC clearly states that the supplementary disclosures should reflect the replacement cost of the newest technology, *i.e.*, $6,200 in this case. But since the firm actually owns and operates an "old" asset with a market replacement cost of $5,800, it seems logical that a comprehensive set of statements should reflect an offset against the mandated disclosure of $6,200. Otherwise, the firm would appear to own a more valuable asset than it does in fact.[23] Therefore, in illustrating a comprehensive Newtech case, an asset offset has been "invented" ($400 in this case) that adjusts the SEC mandated Newtech asset value ($6,200) down to the market price of the actual asset owned ($5,800). This offset essentially combines the ASR No. 190 rule for asset disclosure with a variant of the "value to the firm" approach. Similarly, the "extra" Newtech depreciation and the cost savings numbers that are disclosed in the SEC approach are presumed to be offset by equal debits and credits to retained earnings; *i.e.*, these additional disclosures arise in the context of "wash entries." Finally, consistent with the intent of the SEC, it has been presumed that holding gains or losses would never appear in the income statement but instead would be charged or credited directly to retained earnings.

Illustrative journal entries on the comprehensive Newtech Method follow for the case described in the body of the paper.

It should be pointed out that other approaches for integrating the SEC's

Illustrative Journal Entries, Newtech Method

December 31, 19×0			
DR.	Asset	$6,000	
	CR. Cash, Accounts payable		$6,000
	(To reflect actual purchase price of the asset)		
January 1, 19×1			
DR.	Asset	$ 200	
DR.	Retained earnings	200	
	CR. Asset offset		$ 400
	(To adjust the net carrying value of the "old" asset, while retaining the SEC's desired Newtech cost in the gross asset account)		
January–December, 19×1			
DR.	Various working capital accounts (net effect)	$2,332.31	
	CR. Various income statement accounts (net effect)		$2,332.31
	(To reflect the asset's net operating inflows)		
DR.	Depreciation expense	$1,752.31	
	CR. Accumulated depreciation		$1,752.31
	(To reflect depreciation on the actual "old" asset currently being utilized)		
DR.	Retained earnings	160.85	
	CR. Income statement cost savings		160.85
	(To reflect cost savings in the context or a "wash entry")		
DR.	Depreciation expense	120.85	
	CR. Retained earnings		120.85
	(To reflect the Newtech incremental depreciation in the context of a "wash entry")		

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[23] This treatment is consistent with the "value to the firm" approach that appears to motivate some (but probably not all) Newtech proposals. For example, Parker and Harcourt [1969] appear to favor the Newtech Method since this abandons the replacement cost number when replacement cost exceeds the present value of future cash flows.

Newtech disclosures into comprehensive replacement cost statements are also possible. The method used above merely illustrates one conceivable approach. Because the SEC never addressed this issue, it was necessary to invent a Newtech system. This should not be interpreted, however, as an endorsement of the Newtech approach. Quite the contrary is the case, since Tables 1 and 2 suggest that the two systems will often generate identical results; hence, the Newtech Method may be both a needlessly complex method for reflecting technological change and an unnecessary excursion into the realm of "as if" accounting.

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Compound Journal Entries in Early Treatises on Bookkeeping

Basil S. Yamey

ABSTRACT: This article traces references to and illustrations of compound journal entries in accounting or bookkeeping treatises up to Lodovico Flori's *Trattato* of 1636. It is shown that the practice was referred to, discussed, or illustrated earlier and more frequently than has been supposed.

In his interesting article on the fifteenth-century ledger of Jachomo Badoer, Professor Peragallo [1977, p. 891] remarks *en passant* that until Simon Stevin described the compound journal entry in his book of 1606, this type of entry "is not mentioned in accounting literature." In fact, however, compound journal entries or references to them do occur in the sixteenth-century literature.

A simple journal entry is one which identifies one ledger account to be debited and another to be credited for the event recorded. A compound journal entry is one which indicates that two or more ledger accounts are to be debited and/or two or more ledger accounts credited for the event recorded. Most sixteenth-century texts, and all the Italian ones, illustrate only simple entries. Where necessary, a transaction is broken up into two or more simple journal entries even though a single compound journal entry could have served the purpose. Thus, Luca Pacioli [1494] described the recording of a purchase of goods partly for cash and partly on credit.[1]

> . . . you must make debtor such merchandise and creditor him from whom you have made the purchase. . . . And after [having done] this, you must make another entry, that is [make] him from whom you have bought debtor for the agreed amount of money, and creditor the cash or that bank who paid it for you.

Nevertheless, Pacioli was aware of compound journal entries, and this suggests that they were used in Venetian practice. In the eleventh chapter of his *tractatus*, he explains the use of the terms *Per* and *A* in the journal. *Per* always denotes the debtor "whether there be one or several" (*o uno o piu che se sienno*). And *A* correspondingly denotes the creditor, whether singular or plural. A similar reference to compound entries is to be found in Manzoni [1540, chapter 10, on the journal].

In James Peele's first book [1553], there is also an indirect reference to compound entries. But here it takes the form of explaining that more than one

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[1] The quotation is from the unnumbered "chapter" entitled "Casi che apartiene a mettere al libro de'mercanti" immediately after the last numbered chapter (36) in the *tractatus* on bookkeeping included in Pacioli [1494].

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figure may have to be inserted above (or below) the short horizontal line in the left-hand margin of the journal to indicate the ledger pages or folios to which the entry in the journal has been posted:

> The other space [in the margin] . . . , with a litle overthwart stroke, havyng one figure or figures above, and also underneth, is a direccion unto the greate Booke of accomptes [*i.e* ledger]: wherof the uppermoste figure dooeth directe to the Debitoure in the Quarterne [*i.e.* ledger]: and the nethermoste to the Creditour . . .

Compound entries are used in the earliest published German exposition of bookkeeping by Heinrich Schreiber [1518], an exposition which is not in a Paciolian or Venetian mold. The second entry in the short illustrative journal is a compound entry:

On the seventh of February / I
K1 bought from Hannsen Schymdt 8
C3 tuns of herring / each tun at 6 fl. /
S1 have paid a quarter and will pay
the rest next Whitsun / he has my
signature. Facit 48 – –

The posting references on the left-hand side are, respectively, to the herring account in the *Kaps* (goods book), to the cash account, and to Schmydt's personal account in the *Schuldtbuech* (personal ledger).

Compound entries are also included in Gottlieb [1531], and in Ellenbogen [1537] which is based on Gottlieb. They appear frequently in the illustrative journal in Mennher [1550]. The particular example here is chosen so as to avoid involvement in the peculiarities of the system of factor's bookkeeping set out by Mennher:[2]

Cash is debtor 9 ditto [*i.e.* March]
1 Leonhard Gal is debtor the same day.
$\overline{4}$ Jan Fris paid me £88.15.7 in
$\overline{3}$ cash and further he assigned to me
[the right] to receive from Leonhard
Gal £100. –.–. which he has promised
to pay in 4 days £188 15 7

In 1567, compound entries first appear in an English text by John Weddington published in Antwerp [1567]. The entries in question usually take the form of a long narrative setting out the details of the transaction, followed by the ledger-posting references. In one example the latter appear as:

31
38
42
$\overline{21}$
In the great Boke A 17
28
31

In his second book, James Peele, probably influenced by Weddington's recent example, also introduced compound entries (Peele [1569]). The main discussion in the text on the form of journal entries is similar to that in his earlier book, from which a passage has been quoted above. And the illustrative journal includes many compound entries, of which one example follows:

00 Reperticion apertaining to sondrie
$\overline{14}$ accomptes oweth, to James Hacket
aforesaid. lxxxxii l. x s. and is
in part of. xx. buttes Sackes to saye.

28 Monie oweth. l s.
$\overline{00}$ for so much
receaved of him. 02.10.0

09 Sortinge clothes
$\overline{00}$ oweth. xv. l. for iii.
receaved of him at.
v l. per clothe. 15. 0.0.

36 William Jackson of
$\overline{00}$ Lee oweth. lxxv. l.
for his bill taken of
the same James
Hacket beinge dewe
the. xx. of Julie
laste paste.———75. 0.0.
Somme in all
amountes to———92.10.0 lxxxxij. x.–

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[2] Pointing (*i.e.*, checking) marks are omitted in all examples in this paper.

The ledger folio posting references are displayed clearly. The layout generally is an improvement on that of compound entries in earlier texts. The use of the phrase "Reperticion apertaining to sondrie accomptes" draws attention to the nature of the entry. Peele explains that the phrase "is as muche to saye that sundrye accomptes owethe to some one thing." The word "reperticion" or "reparticion" probably was derived from the verb "repart", now obsolete, which meant to distribute or divide.

Peele, moreover, explains the purpose of compound entries: he is the first author to do so. It is to reduce the number of entries in the ledger, saving effort and presumably space:

> .... Which ordre in some percelles [entries] will do great ease, for happely a man maye bye or sell, at one instant many percelles [parcels or lots] of or to some one man, then by this order of repartinge: there needes but one somme in the margent [*i.e.* money column] of the Leager, for the creditour or debitour to answere a nomber of percelles eyther in debitour or creditour as the case requireth.

The extreme lengths to which this economizing procedure came to be taken are to be seen in some surviving ledgers as well as in some later treatises in which the balance account, the predecessor of our balance sheet, consists solely of two equal and opposite omnibus entries, "To Sundries" and "By Sundries." Examples are to be found in Sir John Banks's ledger dated 1672 (Yamey *et al.*, [1963, plate VIII]) and in the second illustrative ledger in Malcolm [1731].

Compound journal entries occur again in de Hoorebeke [1599]. The following example illustrates the method of cross-referring, in which the single noughts serve the same purpose as the double noughts in Peele, to indicate that the counter-entry is to several accounts:

$\frac{27}{0}$	By profit and loss of the company [partnership] of us three, to sundry accounts for the profit of said company to each for his share of the profit according to his capital, as follows	
$\frac{0}{26}$	To Jacob Boreel for his ½	£544.2.11.
$\frac{0}{26}$	To Philippe Castel for his 1/4	£272.1.5½
$\frac{0}{38}$	To profit and loss for my 1/4	£272.1.5½
	Sum	£1088.5.10

We now come to Simon Stevin, to whom Professor Peragallo has referred. The form of Stevin's compound journal entries is shown in the following example (the date being omitted), which demonstrates, incidentally, a common treatment in which interest due on a loan is "anticipated," presumably so that the total amount eventually due from the borrower is recorded at once in his personal account:

12	Jacques de Somer is debtor to sundry accounts, because I have given him £500 at interest of 10 per hundred per year, for one month, so that the several accounts are:	
19	Cash that I have given him the said principal sum of	£500. 0. 0.
19	Account of profit and loss, which is the amount of interest on the said principal sum for one month	4. 3. 4.
	Sum	£504. 3. 4.

In the second chapter of his text (Stevin [1608]), Stevin deals with the posting from the journal to the ledger. At first he discusses only simple journal entries "because the explanation is somewhat easier." He then proceeds to compound entries and takes as example the first entry in his illustrative journal, which records the inventorying of the opening assets. He writes: "It is to be noted particularly that here I make use of an abridgement not to be found in common practice; this method appeals to me, although I leave it to each to follow his own judgement." The abridgement is that a single total entry is made to the credit of the capital account. The common practice of itemizing each asset in the capital account is judged to be unnecessarily burdensome

> because if I review the entries in my capital account, it is more efficient [*bequamer*] to have before my eyes the single sum [of my assets] than the many parts [of it]. But if I have doubts about any one of these parts, I can find conveniently all the details in the journal.

He then shows the similar advantage of the compound entry where a merchant buys several types of goods at the same time—an example also used by Peele in the expository part of his text when he first discusses compound entries.

Finally, he disposes briefly of the possible objection to the use of such entries that they make checking more difficult in that some ledger entries will not be matched by equal counter-entries in other ledger accounts.

The first examples of compound journal entries in the Italian literature appear to be those in Mainardi [1632]. An example follows, somewhat abridged:

12 To the Community of S. Geminiano . . . L 2163.5
12 To the credit of millet, 170 baskets lir. 1211.5
10 To the credit of rye, 140 baskets lir. 952

But Mainardi does not explain the use of such entries. A full discussion is to be found four years later in one of the best of the early treatises, Flori [1636]. Incidentally, Lodovico Flori does not mention Mainardi in his paragraph on those "who have written excellently" on the subject of bookkeeping, but he does include Simon Stevin (*Simone Stevino*).

In his initial discussion of the journal, Flori considers only simple entries. He describes the characteristic Venetian practice in which in a journal entry two oblique lines (//) are used to separate the name of the account to be debited from that of the account to be credited:

> The two little lines serve only to distinguish the debtor from the creditor: and to point out that from each entry written in the journal two entries must be made in the ledger, one to the debit of the account of the debtor, and the other to the credit of the account of the creditor.[3]

The sixth chapter, "Of collective entries" (*Delle partite collettive*), introduces compound entries. Flori explains "that a collective entry is one written only once in the journal, and one which contains in itself many other entries from the same cause." Suppose there are many accounts which are to be debited various amounts "for the same cause." If one proceeded with simple entries (*alla semplice*), one would have to have as many separate entries in the journal as there are debtors, and also one would have to repeat the title of the creditor account as many times as there are debtors. "Now to avoid this trouble, and to abbreviate the writing, one makes one entry alone"; and he refers to the two model entries in the text.

The following (abridged) example is taken from the journal which is part of the set of illustrative accounts which make up the second part of the treatise:

---

[3] The latter point, that the two oblique lines also indicated the need for a pair of entries, was first made in Grisogono [1609]: *due lineete a traverso // . . . significando che d'una partida che scrivi nel giornale n'hai da far due nel quaderno . . . .*

On the two oblique lines in journal entries, see Yamey [1976].

In some treatises (*e.g.*, Gottlieb [1531]; and Schweicker [1549]) the two short lines are verticals; in Moschetti [1610] they are longer horizontals.

> 0 The following [accounts)] // to house and
> 36 shop rents . . . in advance for the first third of the present year . . . , which each owes . . . for the rent of the house in which he lives, as follows, that is:
>
> 36 Vincenzo Salazar for house no. 1 . . .
> 36 Vito Bianchi for house and shop no. 2 . . .
> 36 Don Cesare Sereni for house no. 3 . . .

Attention is drawn to three points:

1. It is purely coincidental, of course, that the four accounts happen to be on the same pair of ledger pages.
2. In the book itself, in this particular journal entry the oblique lines separating the debit and credit elements are accidentally replaced by the symbol for a unit of currency, the *onza*—an obvious mistake by the printer corrected here in the translation.
3. When the same matter of rents due is treated at a date four months earlier in the journal, there are three separate simple entries. Perhaps Flori intended to show how the same matter could be treated in two different ways. Two alternative treatments in the journal for the same type of "compound" transaction are also to be found in Peele [1569].

According to Besta [1929, p. 402] and Peragallo [1938, p. 85], Flori "follows up Simon Stevin's 'compound entry'." Although they may well be correct, some differences between Stevin's and Flori's treatments may be noted. First, whereas Flori (as do Peele and de Hoorbeke) uses noughts in the posting column to indicate that no account has to be debited (credited) for the collective debtor (creditor) entry, Stevin does not do so. Second, whereas Stevin generally uses the term *verscheyden partien* (meaning several, diverse or sundry accounts) for the collective debtor or creditor, Flori uses the term *appresso*, meaning the following (accounts). (It may be noted that Stevin also uses the term *verscheyden persoonen* for transactions in which only personal accounts are involved, and once the term *verscheyden crediteuren.*) Third, unlike Stevin, Flori indents the posting references to the individual ledger accounts which make up the collective debit or credit. In this he was anticipated by Peele. Finally, in the ledger accounts Stevin includes a reference to the journal page numbers for entries whose counter-entries are collective, whereas Flori rather unhelpfully inserts a double nought in such cases.

The relatively rare appearance of compound journal entries in the early treatises, notably the Italian treatises, is something of a puzzle. Three possibilities may be considered. First, perhaps such entries were not used frequently in practice and, therefore, some authors did not concern themselves with them in their didactic expositions. However, it is difficult to test this conjecture. Early journals seem to have survived the centuries even less successfully than ledgers, so that the origin, frequency, and geographic spread of the practice cannot be established with much certainty. The late Professor Federigo Melis has shown that a Pisan journal of 1399 contains a compound entry; and he has discovered earlier entries in ledgers in the Datini archives which suggest the presence of compound entries in the journals which have been lost. He concluded that "the compound entry was a feature of Tuscan double-entry bookkeeping in the second half of the fourteenth century, indicating a high level of development" (Melis [1962, pp. 421–24, 429]). Examples are also to be found in a Milanese journal of 1457 (Zerbi [1952, p. 381]). All in all, it may be conjectured that compound entries would not have been rarities in practice in Italy during the sixteenth century, although they may have been relatively unknown in England and the Netherlands at the time.[4]

A second possibility is that some of the early authors were so unfamiliar with the details of accounting practice that they were unaware of some of its niceties, such as compound entries. But some of the authors whose treatises are innocent of compound entries (such as Ympyn [1543] and Casanova [1558]) were businessmen or bookkeepers in practice. Their neglect of the subject suggests either personal lack of familiarity with the particular usage despite their practical experience, or else a deliberate decision not to deal with it. This brings us to the third possibility.

It may be suggested that several of the early authors were familiar with the practice of compound entries but chose to use only simple entries in their textbook expositions and illustrations. This would seem to apply, for example, to Pacioli, to Manzoni, and to Peele in his first book, because, as has been explained above, they show awareness of the practice even though they do not explain it or illustrate it. The exclusive use of simple entries could have served to simplify their expositions. It also may have been preferred for other pedagogic reasons. Simple journal entries accorded especially well with the familiar dictum that for every debtor there must be a creditor: in Pacioli's formulation (Pacioli [1494, chapter 36]), "all the entries placed in the ledger must be double, that is if you make a creditor (entry) you must also make a debtor (entry)." The formulation by Flori [1636], quoted above, is another example—and it is evidently not in harmony with his subsequent introduction of compound entries. The discordance between didactic precept and the practice of compound entries was indeed noted by Peele in his second book [1569] in a piece of verse which precedes his first illustrative journal. It is fitting that the last word should be with Peele, who was the first author to discuss and explain compound entries though not the first to illustrate their use:

> And eke in places twaine, of Lidger loke ye set,
> Eache percell that in Iournall standes. The
> first must be the debt.
> Which debt shall aunswered be, in creditour
> alone,
> (Reparticions onlye except, where manie
> springes from one.)

---

[4] Thus, Stevin states (see above) that compound entries were "not to be found in common practice." The earliest English examples known to me are of the late seventeenth century (Yamey *et al.* [1963, plate X]; Yamey [1960, p. 640]).

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The Production Function: A New Perspective in Capital Maintenance

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ABSTRACT: This paper presents a conceptual analysis of two views of output maintenance using the tools of micro-economic theory. The analysis highlights the significance of factor substitution as an essential element in calculating replacement cost. Within this theoretical framework, sales price and cost change are analyzed to determine the relevance of their impact on factor input ratios and output iscquants for both single- and multi-product firms.

THE capital maintenance concept has been variously characterized as cost recovery, maintaining capital intact, replacing capital, and, of course, in the general term of Hicks as being as well off in the end as in the beginning [1946, Ch. XIV]. The Hicks definition of income epitomizes the capital maintenance view in the phrase "... as well off...." Maintaining capital intact or maintaining a level of "well offness" has been interpreted in a number of ways. One interpretation that has received attention recently is that of physical capital maintenance [Sandilands Report, 1975, FASB Discussion Memorandum, 1976]. The physical capital view has been alternatively interpreted as maintaining different aspects of operating capacity. Those listed by Gynther [1970, p. 716] are representative of the views most commonly held, and are expressed as maintaining

(1) the *actual assets* currently possessed,
(2) latest equipment and other assets (incorporating technological improvements) needed to produce the *same volume* of identical output of goods and services, and
(3) the latest equipment, *etc.*, needed to produce the *same value* of identical goods and services.

Although opinions are divided over the choice of which "capital" is to be maintained intact, recent support by the Securities and Exchange Commission (SEC) for item number two, the "present level of output" approach, warrants a conceptual examination. Such an examination is undertaken in this paper, utilizing the tools of micro-economic theory. By use of these tools, we will illustrate how the current accounting literature has neglected certain aspects of the economists' theory of production in developing a replacement cost model.

We would like to express our gratitude to the anonymous reviewers for their valuable comments, and especially to the reviewer whose incisive perceptions were instrumental in the development of the "value to the firm" analysis.

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The use of micro-economic theory enables us to observe the behavior of the approach under investigation in a laboratory setting. While both theoretical and practical aspects of a concept are important in evaluating its use, it is imperative that primary examination be in the theoretical realm. Acceptance of theoretical validity then opens the way for exploration of means of implementation. If none can currently be discovered, the concept will still have value as a normative model. An additional benefit of a theoretical investigation is its potential for revealing significant consequences of given actions which may otherwise go undetected in pragmatic settings.

Capital maintenance concepts are based on the assumption that whatever is defined as "capital to be maintained intact" is only so maintained in a notional sense. Maintaining capital means that sufficient funds have been "set aside" from revenue to provide for the replacement of capital utilized in generating revenue so that the "well-offness" of the firm is assured. This does not mean, however, that such capital shall necessarily be set aside and utilized in this fashion. It is rather a conceptual "benchmark" used in the calculation of income to indicate when the *ability* to replace capital consumed in operation has been achieved. That sufficient capital must be recaptured, may imply an amount more than "necessary" for replacement. This would make the firm "better off" in the end than in the beginning. It is, therefore, not unusual that the volume of output approach to capital maintenance is defined as the *minimum expenditure necessary* to maintain the productive capability to generate a given "level" or "volume" of output. The SEC [SAB No. 7, 1976, Par. I,1,a] defines replacement cost as "the lowest amount that would have to be paid . . . to obtain a new asset of equivalent operating or productive capability. . . . " However, an analysis of the SEC's approach indicates that the emphasis in replacement is on the productive capabilities of each input factor, independent of the process in which it is utilized. A definition of replacement cost such as that used by the SEC might be valid in a static setting in which relative factor and output prices are stationary. In a world in which general price levels as well as relative price ratios may change, consideration must be given to the potential for shifting price ratios for both input factors and commodities. To the extent that this SEC definition neglects the potential for factor substitution resulting from changing factor price ratios, it, in effect, becomes one way of measuring the maintenance of "assets actually possessed" or the physical identification approach listed as the first of the operating capacity views.

Further examination of the SEC's view of productive capacity [Par. I, 1, b] which states that

> The productive capacity of a manufacturer would be measured by the number of units it can presently produce and distribute within a particular time frame: . . .

reveals that an alternative interpretation is also justified. A literal interpretation of ". . . a company's ability to produce. . . " suggests that the level of the output to be maintained is associated with *the company's* capability rather than that of specific assets. Maintaining the output of the firm certainly does not rule out the potential for changing the combinations of productive resources used in the production process. From this standpoint, the production function of the firm, together with the most current factor prices become the determinants of the minimum costs at which the predetermined volume could be produced.

To analyze a theoretical framework premised on the maintenance of productive capability associated with *a specified* level of output for the *firm*, requires the identification of some "notional" level of output, that is, the selection of an appropriate output level to represent the productive potential to be maintained. Then, at the end of the period, the minimum cost necessary to duplicate that total volume is determined and used in calculating income for the reporting period. This is not the expected cost to be incurred in the coming period to replace the reporting period volume, but is the cost that *would be* incurred if the same productive capability of the reporting period were to be maintained.

Since at any given time the firm has an output capability ranging from zero to its maximum capacity, selection of the appropriate "benchmark" level becomes crucial. In a pragmatic setting, selecting and implementing a "benchmark" output level can be handled by use of a mechanism similar to that encountered in standard cost systems, where costs are based on a predetermined level of output such as "normal" or "budgeted" capacity. Deviations of actual production from the predetermined capacity level are reported periodically in income as "variances." Thus, standard costs are considered the *true* costs for inventory and cost of sales purposes.

The problem of selecting the benchmark volume of output is simplified when it occurs within the confines of neoclassical production theory. From this standpoint, the firm's productive capability to be maintained is determined by using a profit-maximizing assumption. The determination of this optimal level occurs *ex ante* for each reporting period and establishes the benchmark volume. It should be noted that an *ex post* optimum does not appear to be in strict conformance with "maintaining an output capability" for it would incorporate into the benchmark the growth or decline in capability occurring during the period as a result of operations.

In the section that follows, we shall first review neo-classical production theory for a single product firm. Implications for replacement cost accounting will then be drawn and illustrated under an accounting approach based on micro-economic theory that will be referred to as META (Micro-Economic Theory applied to Accounting). A simplified illustration will show the distinction between the META method of replacement accounting and the more conventional current value replacement cost (CVRC) approach. The next section presents a micro-economic analysis of the impact of price/cost changes for a multi-product firm. The third section modifies the volume of output concept by adopting "a value to the firm" view within a META setting, as an alternative to the productive capability of the firm view. The final section presents a summary and conclusion.

THE SINGLE PRODUCT FIRM

Production Theory

The theory of production for the single product firm indicates how various inputs may be combined to produce a stipulated output of a given product in an economically efficient manner. Characteristic of neo-classical production theory is the principle of factor substitution, which implies that the same output can be generated by various combinations of inputs. Thus, any efficient combination[1] of factor inputs capable of maintaining the benchmark volume of production established at the beginning of the period would be interpreted as maintaining productive capability. Since the production function indicates how various input factors may be combined to generate a given output level, it will play a significant role in calculating the minimum *cost* to maintain productive capability. To facilitate analysis, we shall make the following simplifying assumptions:

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[1] Efficiency in production refers to the minimum cost of producing any given level of output.

(1) the objective of the firm is to maximize profits,
(2) the production function allows for unlimited and continuous factor substitution, along convex isoquants,
(3) the cost of shifting from one factor to another is zero, and
(4) there is perfect competition in both factor and product markets.

The neo-classical approach to the production problem of the single product firm is to minimize the cost of producing a given level of output subject to a given production function. The solution to this problem can be summarized by the following theorems as derived by Samuelson [1947, Ch. IV]:

Theorem 1. For total costs to be at a minimum the ratio of the factor prices must be equal to the ratios of the marginal productivities of the factors.

The ratio of the marginal productivities of factors i and j are also referred to as the marginal rate of technical substitution, the rate at which one input factor can be substituted in production for another, and is represented graphically as the slope of a two dimensional isoquant.

Theorem 2A. Changes in factor employment ratios are inversely proportional to changes in factor price ratios.

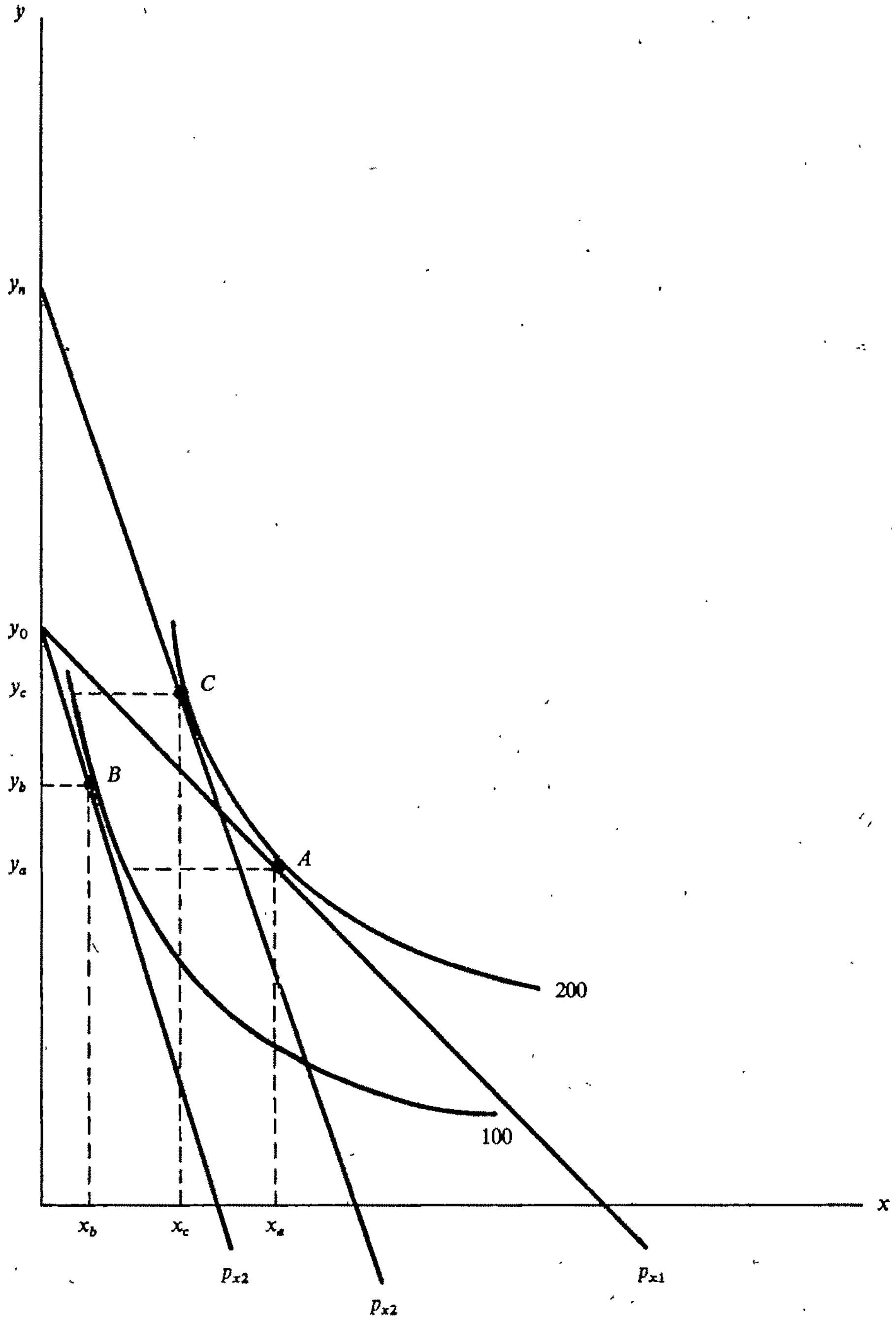
Theorem 2B. Any fixed output will always be produced with less of any given factor whose price rises relative to all other factor prices.

Theroem 2A implies that the higher the relative price of a given factor the less, proportionately, will it be used in the production process. This, of course, assumes that production is not constrained by fixed proportions, that is, where only one combination of inputs can produce a specific product. The implication of Theorem 2B is that if the same quantity of a product is to be produced after an increase in any one factor price, it could be done only at a higher budgetted cost.

The results of Theorems 2A and 2B are readily summarized in Figure 1. The figure depicts two isoquants, one showing a production level of 100 units, the second a production level of 200 units of some commodity G. Figure 1 shows the effect of an increase in the price of factor x and no change in the price of factor y. The initial price ratio between factors x and y is reflected in the slope of the budget line y_0p_{x1}. After the price change the budget line shifts to y_0p_{x2} and the initial budget is no longer capable of producing 200 units of output. The best it could do, do, as indicated by the point of tangency B, would be to produce 100 units, by using y_b units of y and x_b units of x. If the original budget were used with any other combination of x and y, not even 100 units of output would be achieved. To maintain the original output level of 200 units, the budget must be increased so that sufficient quantities of x and y may be acquired at the new price for factor x. This is shown in Figure 1 by budget line y_np_{x2}. The additional outlay for this new budget line shows the additional cost of producing 200 units as a consequence of the increase in the price of factor x. This new budget line is tangent to isoquant 200 at point C, which indicates that the least cost combination for producing 200

FIGURE 1

ILLUSTRATION OF FACTOR SUBSTITUTION



units of commodity G would be y_c units of y and x_c units of x.

As the result of an increase in the price of x, with no change in the price of y, the same 200 units of commodity G are now being produced with fewer units of factor x and more units of factor y. The original cost (K_0) of producing 200 units of commodity G can be computed by multiplying the old factor quantities by their respective old factor prices, and taking the sum of the products, thus:

$$K_0 = p_{x1}x_a + p_y y_a. \qquad (1)$$

the new cost (K_n) of producing 200 units of commodity G is computed in a similar manner, however not only the new prices, but also the new quantities are taken into account, as follows:

$$K_n = p_{x2}x_c + p_y y_c. \qquad (2)$$

the computational method of Equation tion (2) is referred to as the META approach. The more traditional CVRC method neglects the effects of factor substitution and computes the new cost (K_n) using the *new* prices but the *old* quantities of input factors, thus:

$$K_n = p_{x2}x_a + p_y y_a. \qquad (3)$$

Computing Production Costs and Income

We shall now present a comparative illustration of traditional CVRC and META in an accounting format. Table 1 presents a comparative calculation of replacement cost. Table 2 displays the comparative income statements. Both illustrations assume the following initial conditions for the reporting period:[2]

(1) Production of commodity G is carried out with the use of two factors, x and y;

(2) The initial prices of the factors are as follows:

x = \$1 per unit
y = \$2 per unit

(3) Given these factor prices, the least cost combination of factors required is:

1 unit of x per unit of G
$\frac{1}{2}$ unit of y per unit of G

	Used	*Units of G Produced and Sold*
quantity of input factor x	200	200
quantity of input factor y	100	
sales price of G	\$10 per unit	

At the end of the reporting period it is assumed that the price of factor x increases from \$1 per unit to \$4 per unit. This change in factor price ratios causes a shift in least cost combinations for product G from 1 unit of x and $\frac{1}{2}$ unit of y, to $\frac{1}{2}$ unit of x and 1 unit of y.

In the comparative illustration of income calculation, holding gains are not reported as a component of income and are assumed to be capital adjustments. The decision to exclude holding gains was made after considering the controversy surrounding the issue [Sandilands Report, 1975, p. 31; FASB D.M. 1976, p. 132; Morpeth Report, 1976 par. 33], and to focus attention on the issues raised in this paper.

It can be seen that a change in the input ratio resulting from factor substitution yields a lower cost to replace than CVRC. Hence, as a general rule, the META method will generate a higher profit than the CVRC method. Regardless of under-

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[2] We assume that production and sales equal the *ex ante* optimum.

TABLE 1

COST OF PRODUCING ONE UNIT OF COMMODITY G

Initial Cost Computation

Panel	(1) Input Factor	(2) Factor Requirement Per Unit of G Produced	(3) Factor Price	(4) Input Cost Per Unit of G (col 2× col 3)	(5) Total Cost Per Unit of G (Σ col 4)
A	*x*	1	$1	$1	$2
	y	½	$2	$1	

CVRC Cost Computation

	(1) Input Factor	(2) Factor Requirement Per Unit of G Produced	(3) Factor Price	(4) Input Cost Per Unit of G (col 2 × col 3)	(5) Total Cost Per Unit of G (Σ col 4)
B	*x*	1	$4	$4	$5
	y	½	$2	$1	

META Cost Computation

	(1) Input Factor	(2) Factor Requirement Per Unit of G Produced	(3) Factor Price	(4) Input Cost Per Unit of G (col 2 × col 3)	(5) Total Cost Per Unit of G (Σ col 4)
C	*x*	½	$4	$2	$4
	y	1	$2	$2	

Notes to Panels A, B and C:
A. Presents initial cost for reporting period.
B. Presents replacement cost as traditionally calculated using original factor mix.
C. Presents replacement cost as suggested, considering substitutability of input factors.
Observe: (1) Col 2 is same for panel A and B.
(2) CVRC overstates cost of replacement.
(3) CVRC also overstates holding gains when they are reported.

lying theoretical assumptions, and costing methods, an alert management will initiate use of least cost combinations. The growing substitution of plastics, pressed paper, and pressed boards in the automobile and construction industry is evidence of this point.

The Influence of Commodity Price Changes

The previous discussion assumed no change in the price of the commodity being produced and sold. We are ready now to release that assumption. In a

TABLE 2

COMPARATIVE ILLUSTRATION OF INCOME CALCULATION

	CVRC	*META*
Units G sold—200@$1		
Sales Revenue	2000	2000
Cost of Sales—Replacement:		
(A) CVRC 200@$5	1000	
(B) META		800
Components:		
x 100@$4=400		
y 200@$2=400		
Operating Income	1000	1200

competitive environment, an increase in the price of product G will lead to an increase in the profit maximizing output quantity of that commodity. An upward shift of average revenue will have a comparable effect on the profit maximizing output quantity of a firm operating under conditions of *imperfect* competition as well. Thus, in the same manner that a shift in cost generates a new optimal level of output for the ensuing period, a shift in the product sale price will generate a new optimal output level. However, this new optimal level has no relevance in the theoretical model using the notion of maintaining productive capability of the period just expired (*i.e.*, the reporting period) and in costing activity of that period. Thus, in the absence of a change in factor price, the benchmark volume of the past period can be duplicated in the following period at the same budget cost as before the sale price change. We can conclude that changes in product sales prices are irrelevant to the problem of factor substitution in maintaining benchmark capability.

THE MULTI-PRODUCT FIRM

If a multi-product firm were to operate simply as a collection of single product firms, the foregoing analysis of output as a measure of capital maintenance could be invoked and the problem dispensed with by extension. The fact is, however, that the multi-product firm has an additional problem to face; how initially to apportion the available input factors among the different products. Since any given bundle of inputs is capable of generating a number of alternative efficient combinations of outputs the following questions arise: (1) What is the optimum or benchmark mix of output commodities to produce? and (2) How do we measure the extent to which capital has been maintained intact when changes in factor prices and product sale prices cause a shift in the optimum mix of output?

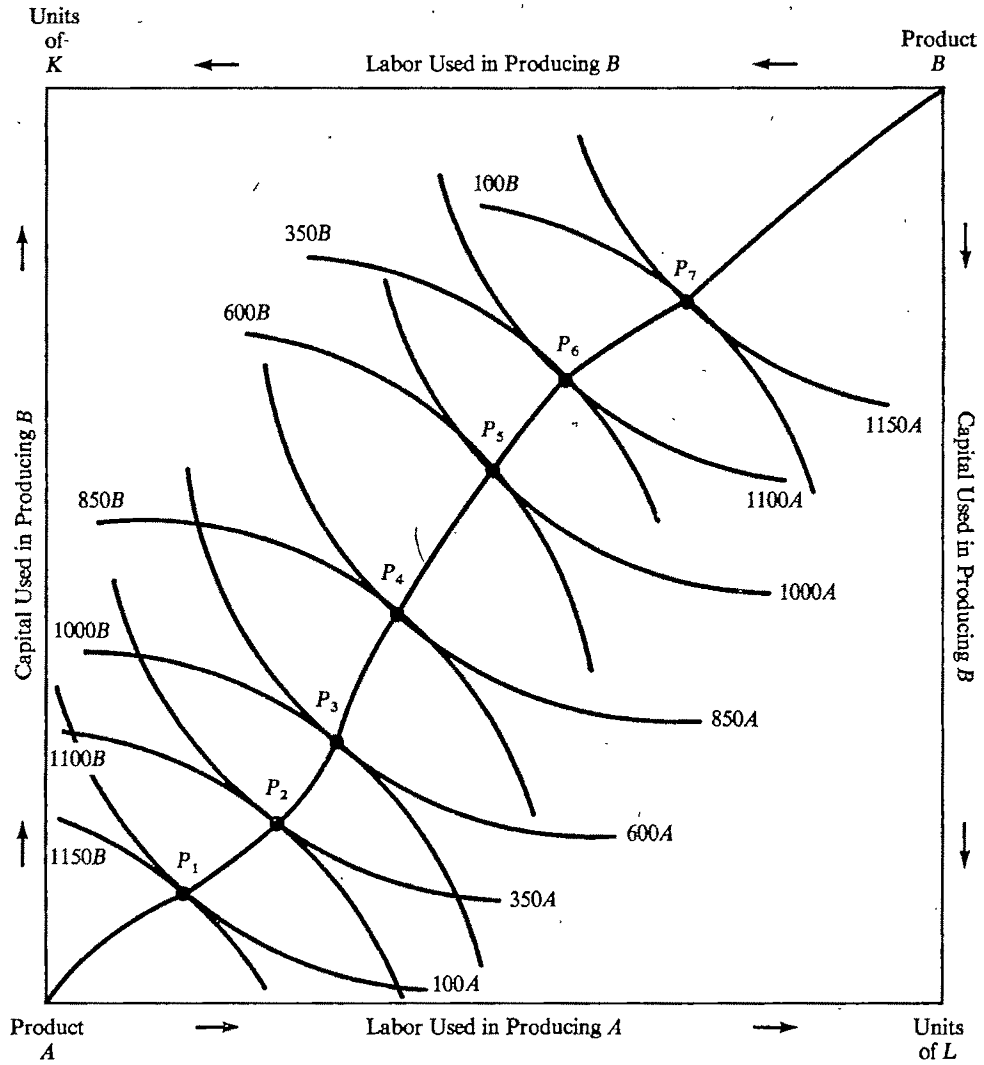
Multi-Product Firm—Optimum Product Mix

The solution to the first problem can be illustrated graphically by limiting our analysis to two products. The distinguishing features of the two-product firm are that; (a) each of the products may be produced with different factor input ratio, and (b) factor price changes will affect each of the products differently. Not only will a change in the factor price ratios change the ratio of inputs with which each of the products is produced, but a change in the product mix may also occur. Thus, an increase in the price of labor *vis-à-vis* capital will not only cause each product in the output mix to be produced with more capital and less labor, but will also change the output mix. Profit maximizing firms will now find it more profitable to shift resources from the labor intensive product to the capital intensive product.

Although the interactions are more subtle than in the single-product case, our task will still be to interpret the effect of a change in either input or output price on the defined capital maintenance objective. The analysis will again focus on the efficient utilization of inputs through factor substitution. For the single-product firm, this is represented by any point on a given isoquant. For the two-product firm we must consider points on the respective isoquants of both products. Here, since the resources are rationed, the output of one product depends upon the resources used by the other. Efficiency in production, therefore, is achieved only at specified combinations of output. Theoretically, these combina-

FIGURE 2

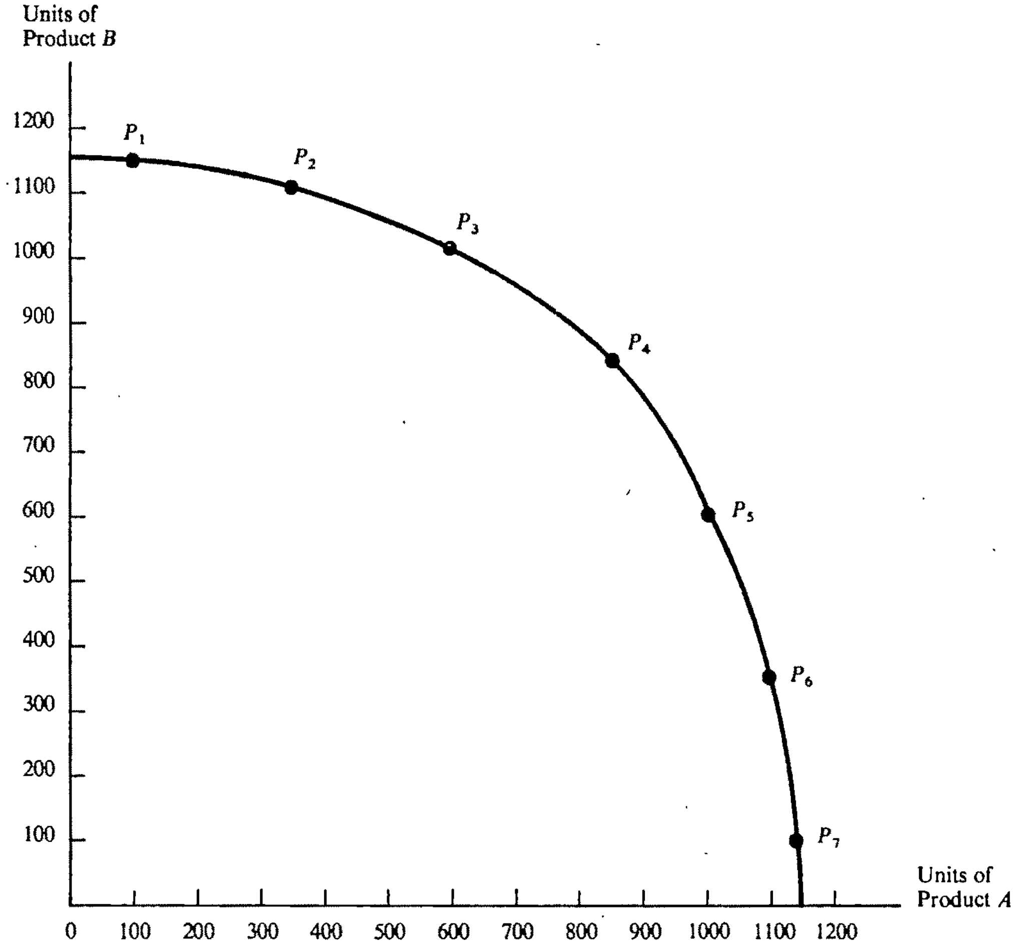
THE EDGEWORTH BOX



tions are points where inputs are used with equal efficiency in the production of either product. For the single product firm, "efficient" factor substitution is graphically illustrated by a movement along that product's isoquants. In the two-product case these movements occur simultaneously along the isoquants of both products. Hence, the graphic illustration used must contain the isoquants of both products. Suitable for this task is the Edgeworth Box diagram (Figure 2), which permits all possible allocations of input factors (between products) to be visualized and all *efficient* combinations of output to be obtained. Before the *optimum* output combination is illustrated, input space must be connected to output space. This is accomplished by transferring the points of efficient output (con-

FIGURE 3

PRODUCTION POSSIBILITY FRONTIER



tract curve) from the Edgeworth Box to the Production Possibility Frontier (ppf). All efficient output combinations are then reflected by the ppf curve (Figure 3). Movement along this curve represents the ratio at which a given quantity of one product can be substituted for the other and is known as the *marginal rate of transformation.* The profit maximizing combination is now determined by introducing the relative revenue contributions represented by the products' price ratio line, and noting its point of tangency with the ppf.

In its most general form, the problem of the multi-product firm is to maximize its profits from the sale of a number of products subject to the limitation of the production function. The solution to this problem may be approached by using neo-classical methods which yield the following theorems [Henderson and Quandt, 1971, pp. 89–98]:

Theorem 3. The marginal rate of transformation (MRT) for each pair of products (when the level of all inputs and all other output quantities are held constant) must be equal to the ratio of the prices of the respective products.

Theorem 4. The marginal rate of technical substitution (MRTS) for each pair of inputs (when the levels of all other input and all output quantities are held constant) must be equal to the ratio of the prices of the respective inputs.

Theorem 5. An increase in the input price of factor *i*, all other input prices remaining unchanged, will lead to a decrease in the employment of that factor.

Theorem 6. An increase in the sales price of product *j*, all other product prices remaining unchanged, will lead to a relative increase in the production of that commodity.

Theorems 3 and 4 are the first-order condition for profit maximization for the firm discussed earlier and require no further comment.

Multi-Product Firm—Input Price Change

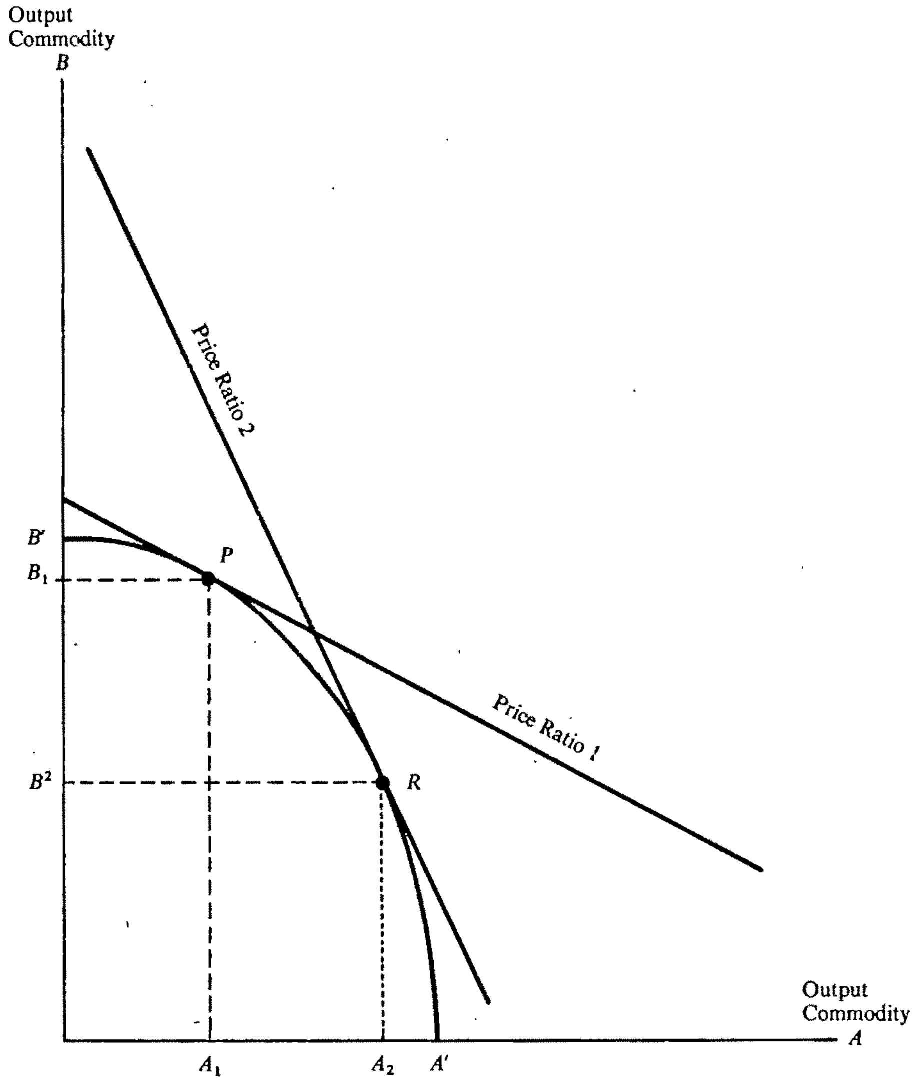
The implication of Theorem 5 is that an increase in the price of one of the factors will result in a new MRTS in the production of both products. The new factor price ratios shift the points of tangency in the Edgeworth Box, thereby creating a new efficiency locus and consequently a new ppf. To understand how this would produce an impact on the multi-product firm, let us reflect on how a factor price change was treated in the single product case. There, an increase in the factor price reduced the output level. To maintain the same benchmark volume of output, the firm would have had to increase its budget. To maintain the same benchmark volume mix in the two-product case will also entail an expansion of the budget. This may be envisaged as an expansion of the Edgeworth Box. The new ppf that emerges will have a different configuration from the ppf for the reporting period. The original optimal mix for the reporting period will no longer be on the new ppf since it is no longer efficient. It will now be located somewhere within that frontier. Regardless of this convoluting of the ppf under the productive capability approach we still use the *ex ante* optimum mix to determine the new input ratio. Implicit in Theorem 5, however, is that *relative* input cost can change, generating a new optimum mix. This point, is relevant to the "value of the firm" view (discussed in a later section) where the *ex post* optimum mix is the focus of attention.

Multi-product Firm-Sales Price Change

The implication of Theorem 6 is that even though factor input prices remain the same, a product (sales) price change will induce a product mix change which would entail a movement upward to a higher isoquant for one product and a decrease to a lower isoquant for another. This is shown in Figure 2, which presents a two-product production possibility frontier. The actual allocation of production between product *A* and *B* depends upon their price ratios. The slope of the line labelled price ratio (1), reflects an initial price ratio. With price ratio 1, the optimum product mix would be at point *P*, giving rise to a production allocation of A_1 units of commodity *A* and B_1 units of commodity *B*. The line labelled price ratio (2) reflects a change in that ratio. The optimal production combination is now shifted to point *R*. Thus, the production of *A* has been increased from A_1 to A_2 and *B* decreased from B_1 and B_2 *solely* as a consequence of the commodity price change. This shift in the ppf shall be seen to be relevant in the next section under the "value to the firm" approach. However, since no change will occur in the MRTS associated with the *ex ante* optimal volume, no change would be recognized in the cost to

FIGURE 4

IMPACT OF PRICE RATIO CHANGE ON PRODUCT MIX



reproduce that volume. Hence the impact of a product sales price change on input ratios is ignored under the output capability concept in a multi-product firm.

Impact of Technological Change

We have set forth the impact of a change in factor input price and product sales price in a manner consistent with the definition of output maintenance presented earlier. However, technological change may also have an impact on the cost of replacing the reporting period's volume by changing:

(a) the magnitude of input factors used,
(b) the proportion of input factors used, or
(c) both.

When technological change will have an

influence on the cost of maintaining *ex ante* optimum volume, the change in cost should be recognized. Its impact will be to shift input ratios and change budget requirements, in essence, an impact similar to that caused by a change in input factor price. However, technological changes may, *ex post*, make another level of output the optimum level. Where the objective is to maintain *ex ante* optimum of the reporting period, this shift will again be ignored. This aspect of technological change will produce an impact only on the coming period's determination of optimum output.

VALUE TO THE FIRM

Reflections on Productive Capability Approach and Value to the Firm

In the previous discussion the physical capital maintenance concept of maintaining a volume of output has been interpreted as recapturing the cost to duplicate the *ex ante* optimal volume of output for the reporting period. Therefore, if a new optimal output level emerges at the end of the reporting period, it would be irrelevant in calculating replacement cost for that reporting period. All parameter changes in input factor prices are interpreted in relation to the reporting period's *ex ante* optimum volume. In this respect, the view emphasizes the cost of maintaining the combined productive capability that existed at the beginning of each reporting period even though that volume at the end of the reporting period is no longer optimal. This is in agreement with a literal interpretation of "maintaining intact" and "as well-off in the end as in the beginning." Maintaining a volume of output may also be viewed from another perspective, one that emphasizes the cost of replacing the output under the *ex post* conditions of optimality. This view recognizes as a shortcoming of the "*ex ante*" view, that while it does focus on the productive capability that existed at the beginning, it does not yield the economic cost to replace. The economic cost to replace is based on all current factors associated with replacement. Since the firm is assumed to be a profit maximizer, if replacement occurs, it should occur under current minimum cost conditions. Thus, the input ratios associated with *ex post* optimality would appear to generate the appropriate value to the firm. Graphically, this means the input ratios reflected by the tangency of the *ex post* optimal output level and the new budget line would be the relevant ratios to use in calculating the cost to replace the reporting period's volume.

This interpretation is in line with the "value to the firm" or "deprival value" approach. The "deprival value" concept treats as cost of production the net cost (or loss) which the firm would experience if deprived of the product. While the appropriate amount may be either replacement cost, net realizable value, or discounted present value, it is generally believed that the preponddrant choice will be replacement cost. The Sandilands Report [1975, p. 60], concedes that in a "great majority" of cases, replacement cost will represent the "value to the firm." Given a profit maximizing assumption, replacement will occur only when replacement cost is lower than either net realizable value or discounted present value and, hence, will constitute the basis for accounting valuation. Where the product line is being contracted or discontinued, to the extent that reporting-period volume is not to be replaced in total, the excess production of the reporting period would be appropriately costed in accordance with the "value to firm approach." (See Sandilands Report [1975, pp. 58–60].)

IMPACT OF MICRO THEORY ON "VALUE TO THE FIRM"

Given the objective of maintaining productive capacity to duplicate the benchmark volume of the reporting period, only input factor prices produce an impact on the factor input ratio. With the adoption of a "value to the firm" approach, attention is shifted to the factor input ratio associated with an *ex post* benchmark volume. This point is extremely significant, for it now becomes necessary to reconsider the factors capable of causing a switch to a new benchmark output.

In accordance with Theorems 2, 3, 5, and 6, discussed above, a change in either input factor prices or product sales prices is sufficient to shift the level of optimum output. This means that even though the market price of input factors remain unchanged, replacement cost charged to the reporting period would change if the sales price of output changed. This would hold for either the single- or multi-product firm. In addition, for the multi-product firm any change in the relative sales price/cost of products could be sufficient to generate a new benchmark volume and new input factor ratio and hence new cost to replace. In the same fashion a change in the production function affecting one product (*i.e.*, due to technology) would have the same impact as an input price change and alter the *ex post* optimum for both products.

The failure to analyze the "deprival value" approach in a micro theory framework has caused the causal relationship between product sales price change and cost to replace to remain obscure.

COMPARING THE TWO APPROACHES UNDER "META"

Under the productive capability of the firm approach, output is maintained in a strict sense by utilizing the *new input factor ratios* associated with the beginning of the period optimal isoquant. In short, it constitutes the basis for calculating the cost to reproduce, in combination with new input factor prices.

The alternative, "deprival value" approach, recognizes that the optimal output level at year end (*ex post* isoquant) presents an alternative source of *new input factor ratios*, a source that is in accord with the objectives of using "value to the firm" as the cost of goods sold.

The distinction between the methods then rests upon which optimal isoquant (beginning or end) is to supply the new factor input ratios.

In the first method, the *new* input ratios may only be obtained from specific points along the *ex ante* optimum isoquant. In the second method, the *new* input ratios are obtained from points along any isoquant that is optimal at the end of the period. Thus, those factors that are causal in selection of new input ratios under either method, are capable of generating a change in the cost to replace.

A. *Productive Capability of the Firm.* Here, costs charged to operations are influenced by:

(1) input price changes, and
(2) factor substitution along the *ex ante* isoquant caused by input factor price changes.

B. *"Deprival Value" Interpretation.* Under this approach costs charged to operations are influenced by:

(1) input price changes,
(2) factor substitution along the *ex post* isoquant caused by either
    (a) factor price change, relative and direct, or
    (b) output sale price change, relative and direct.

SUMMARY AND CONCLUSION

In this paper, we have investigated the productive capability (output level) of the firm concept of capital maintenance within a micro-economic setting. Under this approach, productive capability of the firm for the current year is interpreted as the "optimum" volume of output for the *reporting period.* It was indicated that this volume is essentially a benchmark volume and not a level that is actually to be reproduced. To facilitate analysis within a theoretical framework and with no loss of generality, the *ex ante* optimal output for the reporting period is selected as the benchmark level. Consistent with the micro-economic structure, it was proposed that input factor substitution be considered in establishing unit cost to duplicate benchmark volume when factor costs change. Since the benchmark volume is *ex ante* to each reporting period, only input ratios associated with that isoquant are relevant in establishing "notional" costs to reproduce. Therefore, only changes in the market price of input factors influence the input ratios associated with this benchmark volume. This point holds equally for single-and multi-product firms.

The final section of the paper viewed the volume of output for the firm from the standpoint of new cost to reproduce calculated from the *ex post* optimum production, essentially a "deprival value" concept. Here the input factor ratios relevant in calculating unit cost are obtained from the optimum output level at the close of the reporting period rather than at the beginning of the reporting period. Since a new output isoquant is now the source of input factor ratios, a change in product sales price is sufficient to cause a shift in output and hence a change in factor input ratio. This point also holds true for single-and multi-product firms under the "deprival value" view. In addition, under the "deprival value" view, relevant output isoquants for multi-product firm are also sensitive to relative price/cost changes.

In conclusion, although we believe that the "volume of output for the firm" concept of capital maintenance can be viewed from the standpoint of the two interpretations we have assigned, acceptability is only asserted within the constraints we have imposed. Removed from the sterility of a theoretical framework all problems of the real world arise. This does not deny, however, the validity of input factor substitution as long as one realizes that it occurs subject to (a) existing short-run possibilities and (b) the costs of changing the factor ratios. That a theoretical optimum output is an unrealizable attainment in the real world is no serious drawback. One need only substitute the best attainable output under existing constraints as the benchmark level. Of course, in the absence of certainty, production will vary from the benchmark level. Again, this variance may be handled in a manner similar to the variance of actual output from budgeted or normal capacity volume in a standard cost system. Unit costs based on the benchmark volume will, in a similar fashion, be considered the "true" cost to reproduce. Calculating cost to reproduce based on current input ratios appears to be consistent with the broad concept of current value accounting. Certainly, using current costs with "historical" input ratios suggests a less-than-desirable union. Finally, as a general rule the META approach will yield a lower cost to replace than CVRC.

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Toward A Better Understanding of the Role of Measurement in Accounting

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ABSTRACT: This article examines the ratio-scale view in accounting from the standpoint of modern measurement theory. It also provides interpretations of the tenets of modern measurement theory in accounting.

A deeper familiarity with modern measurement theory would help synchronize accounting literature with the scientific approach and avoid many misunderstandings still occurring in the accounting literature [Mattessich, 1972, p. 476]. In the January, 1976, issue of THE ACCOUNTING REVIEW, an article by Don W. Vickrey raised some important questions about the relationship between accounting and measurement theory. The object of that article was to examine the relationship between the numerical output of a given accounting system and the tenets of measurement theory. The General-Price-Level Historical Cost system (GPL accounting) and the ratio-scale view were selected for evaluation against the requirements of the theory of fundamental measurement. That evaluation identified four difficulties: (1) object difficulty, (2) property difficulty, (3) operation difficulty, and (4) index difficulty. Vickrey's [1976, pp. 33, 39] analysis of those difficulties led him to conclude "that the ratio-scale view is invalid."

The purpose of this paper is to reexamine the ratio-scale view and the related object, property, and operation difficulties from the standpoint of modern measurement theory. To achieve this purpose, it is essential to provide some background on the development of measurement and the applications of modern measurement theory in the social sciences.

ON THE TWISTING OF THE HISTORY OF MEASUREMENT AND THE NUMBER SYSTEM

The history of measurement and mathematics shows that man practiced measurement for thousands of years and only in later ages did anyone analyze the meaning of what he had done [Stevens, 1975, p. 39]. It was the need to assess the numerosity of objects that gave rise to man's first use of a numerical system to express quantity. To measure numerosity, early man created a primitive operation of matching objects to numerical stroke. That primitive operation proved useful in the counting of people, cattle, fishes, coconuts, *etc.* Only very few numbers were used in that primitive operation. The number system gradually expanded to meet the growing needs of trade and commerce, but remained un-

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separated from the process of counting. It was only in relatively recent times that the number system became divorced from the elementary process of counting and has become an abstract system in its own right.

The purpose of this brief comment on the history of measurement and numbers, discussed in more detail elsewhere [Stevens, 1951], is to show that the number system and the rules of arithmetic have been created to serve as a useful model for the empirical operations which man performs on objects [Stevens, 1975, p. 44]. The twisting of this relationship was initiated by Helmholtz (1887) who, according to Stevens [1975, p. 45], "turned the matter around . . . and implied that unless the concrete operations could be mirrored by the mathematical laws of additivity, the operations did not qualify as measurement." Campbell [1953, 1957], the authority on fundamental measurements and the architect of classical measurement theory, followed Helmholtz's ideas and tied measurement even more rigidly to the formal rules of arithmetic by insisting that fundamental measurements are not possible unless the physical operations carried out on the properties of objects satisfy the mathematical rules of additivity. The basis for that contention is the belief that measurement is the process of supplying a physical interpretation for mathematics [Savage, 1970, p. 104]. Thus, instead of the mathematical model being made to agree with empirical operations, as had happened in the early history of arithmetic, Helmholtz and Campbell insisted that the mathematical model dictate what kinds of operations qualify as measurement.

That narrow view of measurement should not be the criterion that determines whether quantification in accounting qualifies as measurement, and it should not be taken for granted by accounting researchers who might attempt to explore the relationship between accounting, measurement, and scientific theories. Why? First, as explained before, the logical foundation of the classical view is in contradiction to the historical evolution of measurement and the rules of arithmetic. Second, Savage [1970, pp. 108–123] has established that the classical view is false because there are some measurable properties for which there exists a physical operation of addition that does not satisfy any of the axioms of mathematical additivity. Third, that view impeded progress in the social sciences and proved particularly costly to psychophysics for many years [Stevens, 1975, p. 44]. Great progress in psychology, criminology, and even political science was achieved only after social scientists divorced their research from that view and put the relationship between the empirical operations of quantification and the rules of arithmetic in the original historical perspective that gave rise to the number system. Most important is the fact that the rules of mathematics are man-made. Those rules can be altered and expanded to provide useful quantitative explanations of man's empirical activity.

The implications for accounting research should be obvious. Accounting numbers need not be analyzed on the basis of the disputed and restrictive view of fundamental measurement that was adopted in physics. Instead, the accounting operations of quantification should be analyzed with a view toward finding a formal model that can make accounting numbers more scientific. Measurement models in the social sciences should be applied in accounting to improve the current measurements of conventional properties [see Mattessich, 1964, p. 58] and to develop quantitative measures for non-conventional properties.[1]

THE TENETS OF MEASUREMENT THEORY

There is no general agreement among scientists and philosophers of science as to what measurement is and how it should be performed [Ackoff, 1962, p. 195]. The tenets of measurement theory are defined and used in physics and psychology in drastically different ways. The differences of opinion on this issue are documented by the deliberations of a committee appointed in 1932 by the British Association for the Advancement of Science to study and report upon the possibility of quantitive estimates of sensory events [see Ferguson, 1940, pp. 331–349]. Since the late 1950s, opinions on the principles of measurement have been classified into two theories of measurement: classical and modern. Comparative discussions of the tenets of the classical and modern views are to be found in Stevens [1959], Ackoff [1962, pp. 195–201] and Savage [1970, pp. 99–189]. The distinction between those two theories has been recognized in the accounting literature by Mattessich [1964, pp. 52–80], and Sterling [1970, pp. 65–71]. The significant differences between the two theories are outlined below.

The classical view of measurement evolved in the physical sciences and was presented in the works of N. R. Campbell [1953, 1957]. According to that view, measurement is restricted to the assignment of numerals to represent properties on the basis of physical laws that are discovered through the fundamental or derived processes [Campbell, 1953, pp. 109–134; 1957, p. 257]. Fundamental measurement of a property is possible only when a physical operation of addition is performed on the object possessing that property and is found to be similar to the mathematical process of addition [Campbell, 1957, p. 267]. Only a limited number of properties, such as length, weight, and numerosity are measurable in this fundamental way. Most other properties dealt with in physics are measured by an indirect process in which derived measurements are obtained by means of numerical laws relating fundamental measurements [Campbell, 1953, pp. 124–139].

Campbell's restrictive view of measurement dominated the scene until it was attacked by the prominent psychologist S. S. Stevens [1946], who advocated a broad concept of measurement that allows for the quantitative expression of sensory events. To support his view, Stevens developed an alternative approach to measurement that eventually became known as modern measurement theory. Under the modern approach, the essence of measurement is mapping empirical properties or relations into a formal (mathematical) model [Stevens, 1959, p. 20].

An examination of the works of Campbell, Stevens, Ackoff, Churchman, Torgerson, and Savage suggests that the major differences between classical and modern measurement theories lie in the following areas: (1) the properties subject to measurement, (2) the tenets that must be satisfied before a numerical assignment can be called measurement, and (3) the nature of the operations that establish a valid basis for the assignment of numerals to empirical properties and events.

Campbell and his fellow physicists have been concerned with the measurement of physical properties of objects such as length, weight, density, mass, and volume. Such properties have been frequently described as extensive properties or objective magnitudes [Stevens, 1959, p. 23]. By contrast, Stevens and his fellow psychologists have concentrated their efforts on the development of a broad approach of measurement to cope with the problem of quantifying psychological and psychophysical properties and sensory events such as utility, anxiety, achievement, loudness, and brightness. Those properties have sometimes been described as intensive or subjective magnitudes [Stevens, 1959, p. 23].

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[1] See, for example, Sorensen and Grove [1977, pp. 658–675], who used a mental health scale (an ordinal scale) in their cost-effectiveness analysis. See also Mock [1976].

The differences between the tenets of the theory of fundamental measurement and the tenets of the theory of measurement scales regarding measurable and unmeasurable properties have metaphysical implications. Campbell [1953, p. 122] says that measurement depends upon the facts of the external world and that "it is not wholly within our power to determine whether we will or will not measure a certain property." In other words, Campbell thinks of objects as having pre-existing properties that are either measurable or not measurable. By contrast, Stevens thinks of measurement as an evolutionary process that begins with simple and crude operations and gradually improves as new well-defined operations are developed. This evolutionary view is expressed in the following statement:

> It is an interesting fact that the measurement of some quantities may have progressed from scale to scale. We can imagine, for example, that certain Eskimos might speak of temperature only as freezing or not freezing and, thereby, place it on a nominal scale. Others might try to express degrees of warmer and colder, perhaps in terms of some series of natural events, and thereby achieve an ordinal scale. As we all know, temperature became an interval scale with the development of thermometry, and after thermodynamics had used the expansion ratio of gases to extrapolate to zero, it became a ratio scale [Stevens, 1959, pp. 24–25].

Campbell [1953, p. 117] says that the process of discovering that a property is measurable by the fundamental process requires a method of judging equality and of adding objects such that the following rules are true: (1) if two objects are the same as some third object in respect of a property, then they are the same as each other, (2) by adding objects successively we must be able to make a standard series one member of which will be the same in respect of the property as any other object we want to measure, and (3) equals added to equals produce equal sums. Those three rules are described as the laws of measurement [Campbell, 1953, p. 119]. In simple words, Campbell's laws mean that a measurable property must possess physical additivity. As an alternative, Stevens [1959, p. 22] suggested two criteria as the foundation of modern measurement theory: (1) the concept of mathematical invariance, and (2) the application of consistent rules in the assignment of numbers.

> The best way out seemed to be to approach the problem from another point of view, namely, that of invariance, and to classify scales of measurement in terms of the group of transformations that leave the scale form invariant. This approach would seem to get to the heart of the matter, for the range of invariance under mathematical transformations is a powerful criterion of the nature of a scale [Stevens, 1959, p. 23].

Stevens [1959, p. 25] defined four scales of measurement: The nominal, ordinal, interval, and ratio scales. Those scales are classified on the basis of the group of mathematical transformations that leave the scale form invariant.

The concept of invariance is fundamental in modern measurement. When measuring a property or event, the scientist carries out certain operations and then assigns numbers to reflect the outcome of those operations. Once the numbers have been assigned, the scientist then asks a crucial question: in what ways can the scale numbers be changed without losing any of their empirical content? [Stevens, 1975, p. 50]. In other words, what mathematical transformations of the scale numbers are permissible? On the ratio scale only one kind of transformation is allowed: multiplication by a constant, *e.g.*, from inches to centimeters or miles to kilometers [Stevens, 1975, p. 50]. That kind of transformation is described as similarity transformation because both the original number and the number produced by the transformation measure the same—property, *e.g.*, both inches and centimeters measure length. The transformation will leave the empirical content of ratio scale numbers unchanged only if the measurement unit is constant in respect of the property being measured (see Stevens [1951, pp. 17–19, 28; Ackoff, 1962, p. 192]).

The search for invariant relations is essentially aimed at generality. The importance of invariance as a tool of scientific thought is exemplified by the notion of conservation of energy. "The total amount of energy in a system stays the same under transformations from one form, such as heat, into another form, such as electricity" [Stevens, 1951, p. 20].

Stevens [1951, p. 1] defines measurement "as the assignment of numerals to objects or events according to rules." This broad definition of measurement is a drastic departure from Campbell tradition for several reasons. First, social scientists [Kerlinger, 1964, p. 412] argue that the measurement of such characteristics of individuals and groups as inteligence, aggressiveness, anxiety, dependency, and cooperativeness involves basically the same thinking and procedures as the measurement of weight and length. Second, the definition suggests that if rules can be set up on some rational or empricial basis, measurement of anything is theoretically possible [Kerlinger, 1964, p. 412]. Third, as Stevens [1959, p. 19] points out, "the fact that numerals can be assigned under different rules leads to different kinds of scales and different kinds of measurement, not all of equal power and usefulness." Nevertheless, as long as a consistent rule is followed, some form of measurement is achieved [Stevens, 1959, p. 19]. The problem then consists of making explicit: (a) the various rules for the assignment of numerals, (b) the mathematical properties of the resulting scales, and (c) the statistical operations applicable to measurements made with each type of scale [Stevens, 1946, p. 677].

Another fundamental difference between the classical and modern views of measurement focuses on the nature of the process that provides a valid basis for the assignment of numbers to properties and events. Campbell [1953, pp. 117–122] says that the only process that can determine whether the laws of fundamental measurement are true is the physical experiment. Thus, the process of discovering a measurable property that satisfies Campbell's laws rests entirely upon experimental inquiry. But what about derived measurements? Campbell [1953, p. 132] says the basis of derived measurements is the discovery of a fixed numerical relation between fundamental magnitudes. In contrast, Stevens thinks of measurement as a process of matching empirical operations with numerical relations. The terms fundamental and derived describe two classes of operations, not two classes of scales [Stevens, 1959, p. 23]. Ackoff [1962, p. 204] clarified the implications of that aspect of modern measurement theory by emphasizing that "the formal properties of a scale should describe what operations can be meaningfully performed on the properties which are measured by the scale." Moreover, the formal properties of a scale do not describe properties of that which is being measured, but properties of the operations that can be performed on what is being measured [Ackoff, 1962, p. 204]. Thus, to say that weight is additive does not say anything about weight itself, but it says something about the operations that can be performed on objects which have weight, and it is this fact that makes measurement an evolutionary process [Ackoff, 1962, p. 205].

THE RATIO SCALE: MEASUREMENT VS MATHEMATICAL TRANSFORMATIONS

There are two complementary aspects of ratio scales. First, ratio scales are measurement devices. An analysis of the tenets of ratio scales as a measurement devices will naturally involve questions about the object, property, and operation of measurement. But ratio scales can also be viewed as a mathematical group structure (a similarity group) that allows a mathematical transformation of the numbers generated by the scale and still leave the scale form invariant. If one wants to analyze the ratio-scale view as a theory of accounting measurement, then the object, property, and operation difficulties are relevant arguments. In this case, those difficulties represent problems that are common to all accounting models, and there is no reason to attribute them to Historical-Cost-Adjusted statements (see Vickrey [1976]). On the other hand, if one thinks of the ratio-scale view as a proposal to adjust historical cost dollars by an index number to satisfy the tenets of the ratio scale, then the problem is mathematical, and the only relevant problem is the index number difficulty. The writings of the supporters of the ratio-scale view suggest that they are merely concerned with transformations allowed on ratio-scale figures. Moonitz [1970, p. 465] and Chambers [1966, p. 45] describe the ratio-scale view as a pure scale adjustment. It is possible to argue that the ratio-scale view presupposes ratio-scale measurements. But then, of course, those measurement difficulties are not associated only with historical cost statements.

OBJECTS IN MODERN MEASUREMENT THEORY

Objects are defined by specifying a set of essential properties which are individually necessary and collectively sufficient for inclusion in the class of interest [Ackoff, 1962, p. 154]. Properties are the observable aspects of objects and are either structural or functional [Ackoff, 1962, p. 155]. Structural properties refer to the matter of which an object is composed and its form, while functional properties refer to the use to which an object can be put [Ackoff, 1962, p. 175]. Thus, while a structural definition defines an object in terms of its physical properties, a functional definition makes explicit the usefulness of an object for certain purposes. For example, physical instruments like scales, balances, thermometers, and barometers are defined in terms of what they are used for rather than in terms of their structures [Ackoff, 1962, p. 155]. More generally, functional definitions are combined with structural definitions [Churchman, 1961, p. 98]. As a result of the growing importance in the physical sciences of the concepts of control, communication, and systems, physicists have become increasingly aware of the importance of functional concepts, *e.g.*, the functional properties of memory and learning attributed to electronic computers (see Ackoff [1962, p. 155]).

There are certain important characteristics of functional definitions; (1) objects with totally different structural properties may produce objects with common functional properties, (2) structural objects require an environment to produce functional properties (for example, tables are useful for writing and eating only if people use them), and (3) functional definitions consist of specification of common properties [Churchman, 1961, p. 98].

OBJECTS IN ACCOUNTING

It has been asserted [Vickrey, 1976, p. 34] that the phenomena to which numerals must be assigned in GPL accounting may be placed in seven mutually exclusive classes: (1) objects with physical form, *e.g.*, monetary units, land, machines and supplies; (2) claims to monetary units to be received in the future, *e.g.*, accounts and notes receivable; (3) claims to services to be received in the future, *e.g.*, prepaid insurance; (4) rights to the use of technological processes, *e.g.*, patents, copyrights; (5) future economic benefits, *e.g.*, research and development costs; (6) promises to remit monetary units, *e.g.*, accounts and bonds payable; and (7) promises to provide products and services in the future, *e.g.*, unearned rent. It has then been argued [Vickrey, 1976, p. 34] that according to the theory of fundamental measurement, only the assets which belong to class 1 are definitely objects. The assets and liabilities which are represented by classes 2, 3, 4, 5, 6, and 7 do not, in that view, constitute objects because they have no physical form and do not possess physical properties such as length and color.

The assertion that claims, rights, promises, and future economic benefits are not objects ignores the role of functional definitions in measurement. The ability to define objects in terms of essential properties presupposes a criterion of relevance. Cash, land, equipment, and claims and rights have different structural properties (claims and rights are usually supported by documents), but from a functional point of view they all produce the common property of economic benefits when used in the ordinary operations of the firm. It is that common property that makes a definition of those objects relevant to the measurement of the activities of the firm. This makes functional definitions more relevant to measurement in accounting than structural definitions.

Future economic benefits pose a somewhat different problem. Clearly, plant rearrangement costs, organization costs, research and development, and goodwill do not by themselves represent physical objects. However, some measurable properties can exist as a result of interaction between objects. Future economic benefits represent the functional property common to all assets, but in some cases that property is dependent upon the existence of other objects that have both structural and functional properties. An analogy can be found in the existence of derived magnitudes, *e.g.*, density and velocity, which qualify as measurable properties in the classical view of measurement. Promises (classes 6 and 7) represent deferred payments for economic benefits already received.

A final note on the object problem may clarify an important issue. Thus far, it has been argued that for the purpose of identifying the elements of the relevant class of objects in accounting, present or future economic benefits are the essential properties of those objects. It does not follow, however, that future economic benefit is the property which accountants quantify. There is nothing in measurement theory which says that the properties useful for the purpose of identification should also be the subject of quantification.

ARE RATIO SCALES RESTRICTED TO EXTENSIVE PROPERTIES?

Another fallacy in the classical analysis of the ratio-scale view is the assertion [Vickrey, 1976, p. 34] that the ratio-scale view will be valid only if the property measured in accounting is an extensive (or physical) property. This implies that ratio scales are restricted to physical properties. That assertion and its related implication are incorrect since they ignore Stevens' psychophysical law that led to many valid uses of ratio scales in the measurement of sensation (see Stevens [1959, pp. 36–59]). The psychophysical law says that "the psychological magnitude ψ is related to the stimulus magnitude ϕ by $\psi = k\phi^n$, where k and n are constants" [Stevens, 1959, p. 36]. The implication of the psychophysical law is that "equal subjective ratios correspond to equal stimulus ratios" [Stevens, 1959, p. 36]. Numerous non-physical properties like loudness and brightness have been perceived as power or linear function forms of the psychophysical law and thus satisfy the tenets of the ratio scale. A ratio scale of utility has been suggested by Stevens [1959, pp. 52–59]. Stevens' psychophysical law has produced dividends in several areas of behavioral science. It has introduced ratio-scale quantification into sociology, criminology, and political science [Stevens, 1975, p. 227]. The methods used in the scaling of brightness and loudness have found immediate application in the scaling of such variables as the perceived status of occupation, the seriousness of crimes, and the degree of national aggressiveness [Stevens, 1975, p. 227].

THE RELATIONSHIP BETWEEN THE PROPERTY, THE MEASUREMENT UNIT, AND THE RATIO SCALE

What property does accounting measure? Several accounting writers [Chambers, 1966, pp. 90–99; Larson, 1969, p. 39; Lim, 1966, p. 645] have referred to monetary numerosity as the central issue in the analysis of accounting measurements. Yet, if the main concern of accountants is to determine the number of monetary units, the accounting function would be reduced to a simple process of counting cash, and most of the controversial accounting issues would become irrelevant. Since the accounting function involves valuation models, monetary numerosity must be ruled out as the relevant property. The simple fact is that measures of monetary numerosity are cardinal numbers that express the quantitative contents of a specific property possessed by the elements of a set of objects. The question, then, is what property does monetary numerosity quantify. That property is exchange value [Moonitz, 1970, p. 465]. Just as the foot is the standard for measuring length and the pound is the standard for measuring weight (in some non-metric countries), money is the standard for measuring value [Stonier and Hague, 1957, p. 366]. Because money serves as the standard for measuring value, it also acts as a medium of exchange. Money also serves as a store of value, and that makes it a useful standard for deferred payments [Stonier and Hague, 1957, pp. 365–366]. Money can perform those functions effectively only if the monetary unit is stable in value. Inflation causes instability in the value of money and consequently impairs the ability of money to perform its functions [Stonier and Hague, 1957, p. 367]. In other words, inflation makes money an unstable unit for measuring exchange value. These are simple facts of economic theory. They need to be related to measurement and to the ratio-scale view.

Theorists of measurement agree that a system must employ a stable unit of measurement in order to qualify as a measurement system [Savage, 1970, p. 204 and p. 211; Ackoff, 1962, p. 62; Ghiselli, 1964, pp. 38–44]. The stability of the unit of measurement is reduced to two requirements: (1) the unit must not change from one measurement to another, and (2) the unit must not change during a single measurement [Savage, 1970, p. 204].

Savage [1970, p. 204] offers two reasons in support of the first requirement. First, unless that requirement is satisfied, it is impossible to duplicate and confirm the results of measurement. If the unit of measurement is unstable, the system of numeral assignment will yield unpredictable and inconsistent results [Savage, 1970, p. 208]. Second, when the unit of measurement changes from one measurement to another, it is impossible to compare the results of measuring different objects [Savage, 1970, p. 204]. Since a basic function of measurement is to allow comparisons of the same property of different objects [Ackoff, 1962, p. 179], a system that does not allow such comparisons does not qualify as one of measurement [Savage, 1970, p. 213].

The reasons for the requirement that the unit remain unchanged from one measurement to another are also a viable defense for the requirement that the unit remain unchanged within a single measurement [Savage, 1970, p. 209]. However, another reason for requiring a stable unit within a single measurement is the axiom of additivity [Savage, 1970, p. 210]. The axiom of additivity.

$$N(x) + N(y) = N(x + y),$$

says that, for a given system of measurement, the number assigned to x added mathematically to the number assigned to y must equal the number assigned empirically to x and y combined. If the unit changes within a single measurement, the axiom of additivity will not be satisfied [Savage, 1970, p. 210].

To summarize, a system of numeral assignments qualifies as a system of measurement only if it permits duplication and comparisons of the results of measurement. This leads to the conclusion that the requirement of a stable unit of measurement is a logical, not an empirical requirement [Savage, 1970, pp. 206–213].

The conclusion that a stable unit of measurement is a logical requirement of any measurement system has two important implications for any analysis of the ratio-scale view. First, it means that Moonitz [1970] and Lim [1966] are correct in proposing the theory of ratio scales as the foundation for price-level accounting. Any person familiar with the uses of accounting statements will agree that the primary use of accounting measurements is to make comparisons. The purpose of comparing accounting figures is to detect change in the exchange value of objects [Moonitz, 1970, p. 465]. Change in any property can not be detected unless the measurement unit is stable. Changes in the general price level make the monetary unit unstable. A basic characteristic of the ratio scale is that it permits the multiplication of the measure of a property by a constant while leaving the scale form invariant, *i.e.*, preserving the empirical contents of the measures produced by the scale. When applied to accounting, this characteristic of the ratio scale provides a remedy for the price-level problem in a way that permits valid comparisons of accounting figures. Second, since the stability of the measurement unit is a logical and not an empirical requirement, the empirical issues of object, property, and operations are irrelevant criticisms of the ratio-scale view in accounting.

EMPIRICAL OPERATIONS OF RATIO SCALES

Ratio scales belong to modern measurement theory. The key empirical operation in modern measurement theory is the matching of an element of one domain with another element of another domain [Stevens, 1975, p. 46]. The operation of matching can be used to map extensive properties, *e.g.*, numerosity, or intensive properties, *e.g.*, brightness, loudness, utility, *etc.* In this new pattern of thinking, subjects can match numbers to sensations in ways that produce ratio scales [Stevens, 1975, p. 61]. People can match numbers to apparent loudness, or match loudness to the strength of a vibration on the fingertip, or match numbers to prestige of occupations [Stevens, 1975, p. 230]. Furthermore, the theory admits matching operations that do not accord with the additivity model [Stevens, 1975, p. 61]. "The fact that a few things in this world can be measured by addition does not prove that everything must be" [Stevens, 1975, p. 61].

The empirical operations of matching may vary widely, depending on what is to be measured [Stevens, 1975, p. 47]. Indeed, the particular operations developed stem directly from the definition of the property to be measured [Ghiselli, 1964, pp. 20–23]. In the measurement of sensation, the operations can be verbal responses, dial turnings, key pressings, or painting of grays [Stevens, 1975, p. 51].

MEASUREMENT AND CALCULATION IN THE HISTORICAL ACCOUNTING MODEL

Conventional accounting numbers are derived from two processes: (1) the assignment of numbers to primary or elementary events, *e.g.*, exchange transactions; and (2) calculation. Only the first process can be described as a measurement since the operations performed by the accountant at this stage are empirical. The measurement of a primary event meets the requirements of the ratio scale. The property subject to measurement in an exchange transaction is exchange value, which is measured by monetary numerosity at the time of exchange. At the time of exchange, the equality of ratios can be verified by an empirical operation. At this stage, the GPL problem is irrelevant since the monetary unit measures exchange value at a given point in time.

After the point of exchange, the empirical base is lost and the conventional accounting model relies heavily on calculation. The processes of accrual accounting and matching consist of a series of calculations. The computation of depreciation charges involves an algebraic transformation of a primary measure. Other algebraic transformations are used to estimate the allowance for bad debts and the estimated liability for after-costs. Additional computations are then performed to calculate profits. The purpose of those accounting calculations is to provide quantitative indicators of certain abstract constructs, such as financial condition or net income.

The need to distinguish between measurement and calculation is essential for any valid analysis of conventional accounting numbers because there is a fundamental difference between measurement and calculation. While the operations involved in assigning numbers to properties in measurement are empirical, the operations involved in calculations are mathematical. The logical validity of calculated measures requires conformity with the rules of mathematical deduction.

Campbell [1953, p. 144] defines calculation as "the process of combining two or more numerical laws in such a way as to produce a third numerical law." While the numerical laws thus combined are derived from measurements, calculation always involves mathematical deduction [Campbell, 1953, p. 147]. "The deduction depends on the fact that if one thing (A) is proportional to another thing (B) and if (B) is proportional to a third thing (C), then A is proportional to C [Campbell, 1953, p. 146].

The evaluation of a model in an empirical science involves: (1) logical truth, (2) empirical verification, (testing the predictive or explanatory power of the model) and (3) empirical meaning or interpretations.

The relationship between GPL accounting and the ratio scale becomes relevant as soon as one considers that the logical truth of conventional accounting calculations depends on: (1) the mathematical validity of the primary measures obtained via the ratio-scale, and (2) the mathematical validity of the deductive process of combining primary measures to obtain calculated measures. The first requirement is valid at the time of the exchange. The ratio scale, however, requires the use of a constant unit of measurement. The instability of the measurement unit over time after the point of exchange violates the basic tenet of the ratio scale, *i.e.*, the scale will not remain invariant when transformations are applied. Thus, when the accountant combines measures of different years without GPL adjustment, he is adding numbers which are not mathematically additive. Accounting calculations performed on such measures fail the test of mathematical truth. In order to make the primary measures mathematically true, the accountant must apply a correction factor, *i.e.*, a constant that leaves the scale form invariant. That constant is an appropriate index number. This correction process makes GPL accounting consistent with the rules of the ratio-scale; *i.e.*, it makes them mathematically true.

The calculated measures obtained via GPL accounting constitute a model. The empirical truth of that model should be determined through empirical verification to determine its predictive or explanatory powers. This kind of empirical verification is entirely different from the requirements of performing certain physical operations to verify equality and additivity (see Vickrey [1976] for the requirements of an extensive system). Such operations are inapplicable to calculated measures. There is nothing in the theory of calculation that requires correspondence between calculated measures and empirical observations. Calculation merely suggests that certain empirical relations might be true, rather than proves that they must be true [Campbell, 1953, p. 147]. In mathematical physics, the correspondence between the empirical properties of natural phenomena and the mathematical properties of calculation is not the work of scientists; it is merely coincidental [see Campbell, 1953, pp. 151–152].

One aspect of this problem is left unanswered: specifically, what do the adjusted figures mean? To answer this question, one should point out that the truth of a theory and its meaning are two different things. It is quite possible to have a theory that is true but meaningless [Campbell, 1957, p. 250]. For example, some theories in modern physics, quantum theory, and the theory of relativity are admitted to be true (in the sense that they predict laws rightly), but may be regarded as meaningless by some people because they involve some hypothetical ideas such as the invisible unit of energy [Campbell, 1957, p. 250]. Even if GPL accounting were empirically untrue (something which has not been scientifically established) or meaningless, it is still correct in relation to the tenets of the ratio scale.

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Cost Variance Investigation: Markovian Control Versus Optimal Control

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ABSTRACT: Control over cost processes can be exercised either via Markovian control, *i.e.*, in the traditional manner by investigating the process whenever the reported cost exceeds a fixed critical cost, or via Bayesian control, *i.e.*, by using the reported cost to update the probability of the process being out of control at the time of the next cost signal, and investigating the process whenever such posterior probability exceeds a fixed critical value. This paper compares the long-run expected cost per period of the best Markovian control (Dittman-Prakash policy) *vis-à-vis* the optimal control (the best Bayesian policy) for a wide range of cost situations. It is observed that Markovian control performs almost as well as the optimal control unless the in-control cost has at least a moderately large coefficient of intrusion (or relative uncertainty) and a substantially greater dispersion than the out-of-control cost. Sensitivity analysis shows that this observation is reasonably robust with respect to changes in the values of other parameters.

Cost variance policies have been the subject of much research in accounting. An excellent survey and synthesis of the literature is given by Kaplan [1975]. The cost-generating process most extensively studied in the literature is the two-state, discrete-time Markov process in which a cost report at the end of each period provides an imperfect observation on the current state of the process. The control problem is to specify the policy as to when a reported cost variance shall be regarded as a statistical variation to be ignored, and when as an indication of change to be investigated.

Research attention has typically focused on two broad classes of control policies: (1) Bayesian control; and (2) Markovian control. In Bayesian control, the manager keeps track of the probability of the process being out of control at the time of the next cost report; the periodic cost reports serve to update this

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probability,[1] and the process is investigated whenever the updated (or posterior) *probability* exceeds a critical value, q. As opposed to this, in Markovian control, the process is investigated simply when the reported *cost* exceeds a critical value, x;[2] the history of cost reports is ignored (or "forgotten").

At this point, one might ask the questions: What is the "best" Bayesian control in any given cost situation—in other words, what is the best critical probability, q^*? Or what is the "best" Markovian control? Or what is the "best" policy among all possible control policies? The answer depends upon the ranking criterion one has in mind. Present value of expected cost is but one such criterion; its use requires specifying the planning horizon. Some other ranking criteria are long-run expected cost per period, statistical variance of the cost per period, effectiveness of control, efficiency of control, data needs and estimation problems, acceptance by practitioners, and information inductance[3] effect on those being controlled. Optimality with respect to one criterion may well entail trade-offs with respect to some other criteria. For instance, one could argue that the evaluation of control policies should give explicit consideration to the trade-off between the mean and statistical variance of the long-run cost per period.

It is a theorem of Arrow *et al.* [1949] that, *with long-run expected cost per period as the ranking criterion*, the optimal policy for any cost situation is equivalent to the best Bayesian policy for that situation. This means that a preference for Markovian control (for whatever reason)[4] necessarily involves an opportunity cost—even if it is the best Markovian control.[5] Dittman and Prakash [1978] show how to determine the best Markovian policy for any cost situation, *i.e.*, how to determine the critical cost, x^*, that minimizes the long-run expected cost per period over all values of x. But the opportunity cost of the best Markovian control for different cost situations is still an open research question, although the simulation results of Magee [1976] suggest that this cost could be relatively small.[6] (Magee did not study the best Markovian control for it was then not yet known.)

The purpose of this paper is to investigate the behavior of the opportunity cost of the best Markovian control over a wide range of cost situations. We will use long-run expected cost per period as the ranking criterion,[7] and obtain our data using analytical (numerical) methods as opposed to simulation.

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[1] The appelation "Bayesian" should not be taken to mean that the control strategy depends somehow on subjective probabilities. It is used in the present context merely to acknowledge the use of Bayes' Theorem for updating probabilities posterior to the receipt of cost reports.

[2] Specifically, we call a control policy "Markovian" only if the control action under the policy can be represented by a Markov matrix on the two states of the cost process. For instance, the "no-information" control policy (investigate the process randomly with a fixed probability, p) is a Markovian control which ignores *all* cost reports, including the latest one (see Prakash [1976]).

[3] "Information inductance" is defined by Prakash and Rappaport [1977] as the process by which information flow affects the behavior of the issuer of information. ("Information use," in contrast, affects the behavior of the recipient.) Information inductance will make the parameters of the cost generating process a function of the control policy.

[4] For instance, a manager may find it difficult to make the psychological switch implicit in Bayesian control—to begin paying attention to probabilities instead of costs.

[5] Strictly speaking, the following exception should be noted. The extremal Markovian policies "always investigate" ($x=-\infty$) and "never investigate" ($x=+\infty$) are also extremal Bayesian policies ($q=0$ and $q=1$, respectively). Hence, if the best Markovian—policy is an extremal one, then it could also be the optimal policy, in which case its opportunity cost would be zero.

[6] In the specific cost situations simulated by Magee [1976], the aggregate expected cost of the first 12 periods' operation under the two-sigma control policy came fairly close to that under Kaplan's policy [1969]. Our Table 4 shows that the values of the optimal critical cost may range from 0.6 σ_1 to 2.7 σ_1 (approximately), depending upon the parameters of the cost situation. It should be borne in mind, however, that our objective function is long-run expected cost per period, which is different from Magee's.

The paper is organized into four sections. In Section 1, some methodological issues are settled, drawing upon the theoretical results of Prakash [1976]. The cost comparisons themselves are tabulated in Section 2, followed by a discussion of results in Section 3. A basic finding of this paper is that the opportunity cost of the best Markovian control is a small fraction of the mean difference between the in-control and out-of-control costs unless the in-control cost has at least a moderately large relative uncertainty and a substantially greater dispersion than the out-of-control cost. In practice, the out-of-control cost should tend to be more dispersed than the in-control cost, because "out-of-control" is a catch-all label. Whether such is in fact the case, is an empirical question. But whenever it is the case, the small opportunity cost of the Dittman-Prakash policy is offset by its simplicity and ease of implementation.

To close the study, we indicate (in Section 4) some of the limitations of this work, and point directions for further research.

THEORY AND METHODOLOGY

Notation

In this paper, we are concerned with cost-generating processes that may be characterized as a two-state, discrete-time Markov process with the following transition matrix:

$$\begin{array}{ll} & \begin{array}{cc}\text{State 1} & \text{State 2}\end{array} \leftarrow \text{At issuance of the cost report} \\ \begin{array}{l}\text{State 1}\\ \text{State 2}\end{array} & \begin{bmatrix} g & 1-g \\ 0 & 1 \end{bmatrix} \\ \uparrow & \\ \text{At start of the period} & \end{array} \qquad (1)$$

Throughout this paper, we denote:

State 1 = The preferred in-control state
State 2 = The out-of-control state
I = Investigation cost (discretionary but fixed)—incurred to find what, if anything, is wrong with the cost process[8]
K = Correction cost—incurred only if investigation cost has been incurred and the process is out of control

For the operating cost per period, which is a random variable conditional upon the state i of the process, we denote (for each $i=1, 2$):

F_i = Probability distribution function $F_i(x)=\text{Prob}\{\tilde{x}\leq x|i\}$
μ_i = Expected cost
σ_i = Standard deviation
$\Delta\mu=\mu_1-\mu_2$ = Mutual separation of the cost

From here on, when we speak of a *cost situation*, we will mean a joint specification of all the parameters, g, F_1, F_2, I, and K.

Theory

Comparing alternative control policies in specific cost situations is a relatively straightforward matter. Complications arise when a general comparison of policies is sought with no particular cost situation in mind. For, then, comparing the (cost) performance of control policies is tantamount to comparing (real-valued) functions of several variables—the domain being the set of all cost situations. In such a case, if an explicit analytic expression for the performance function is not known, comparison is possible only by the use of numerical methods or simulation. Then the multiplicity of variables poses a methodological problem, and drawing general conclusions becomes harder.

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[7] Our choice of long-run expected cost per period as the ranking criterion is motivated by the theorem of Arrow *et al.* [1949]. Kaplan [1969] shows how to find a Bayesian policy by which to minimize the discounted value of expected costs over an infinite horizon. But it is not known whether such a policy is indeed optimal among the class of all conceivable policies.

[8] This is to assume that even when it is known for sure that the process is out of control, investigation cost must be incurred (*e.g.*, to find *what* is wrong) before a corrective action is taken. An alternative assumption would be that investigation cost is incurred only to know with certainty whether the process is, in fact, out of control; thus, the cost is avoided in the special case of perfect information. Of course, in the more interesting case of imperfect information, there is no formal difference between the two assumptions. We use the first assumption only because it simplifies the analytics of the (degenerate) perfect information case.

In this paper, we seek a general comparison of the long-run expected cost under the best Markovian control versus the optimal control. Explicit analytic expressions for the long-run expected costs under the two policies are not known. Accordingly, we will use numerical methods for making the comparisons. But, first, we must resolve how to compress or accommodate the multiplicity of the parameters involved. This we do by reference to some results of Prakash [1976].

For cost situations as defined in this paper, consider the set of all control policies. Prakash [1976] shows that, given any cost situation, the long-run expected cost per period $C(r)$ for any policy r can be written as:

$$C(r) = \mu_2 - \{B\psi(r) - A\}\pi_1(r) \qquad (2)$$

where A and B are constants of the cost situation,

$$A = I + (1-g)K - g\Delta\mu$$
$$B = gI$$

and

$\pi_1(r)$ = "Effectiveness," *i.e.*, long-run proportion of the in-control starts of the process relative to the total number of operating periods under the policy r.[9]

$\psi(r)$ = "Efficiency," *i.e.*, long-run proportion of the in-control states *not* investigated (or Type I errors *avoided*) relative to the total number of the in-control states generated by the process under the policy r.[10]

Thus, for any given cost-generating process, every control policy can be plotted as a point in the unit square, with effectiveness and efficiency of the policy as the coordinates. But not every point in the unit square may correspond to a feasible policy. For instance, the point (1, 1) corresponds to a policy with both effectiveness and efficiency equal to one. Such a policy is feasible only when the states of the cost-generating process are perfectly observable. Prakash [1976] shows that, in general, the *observability* of the cost-generating process depends only on the transition probability and the distribution of the in-control and out-of-control costs. For a proper evaluation of the opportunity cost of the Dittman-Prakash policy *vis-à-vis* the optimal control, it is essential that both policies be systematically exposed to a wide range of imperfectly observable cost situations.

Since, for any given cost situation, the mean out-of-control cost, μ_2, is a constant, this component of the long-run expected cost per period (see Equation 2) is *irrevelevant* for the choice among alternative control policies. Hence, in presenting the comparison, it suffices to tabulate the values of the term $S(r) = \{B\psi(r) - A\}\pi_1(r)$. Since $S(r) = \mu_2 - C(r)$, it may be interpreted as the long-run expected *cost saving* per period resulting from controlling the process under the policy r instead of allowing the process to run uncontrolled forever. Tabulating the cost saving $S(r)$ brings about a large economy in the number of comparisons that need be reported, because the cost saving depends only on the difference between the mean in-control and out-of-control costs and not on their absolute values.

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[9] Here, effectiveness may be thought of as referring to the objective of keeping the process operating in control.

[10] Here, efficiency may be thought of as referring to the utilization of the investigation dollars to achieve the objective of keeping the process operating in control.

A further economy in the number of comparisons that need be made is effected by "normalizing" any one of the cost parameters to unity. Better still, the cost saving term $S(r)$ can be normalized to a *single parameter* expression

$$s(r) = \left\{\psi(r) - \frac{A}{B}\right\}\pi_1(r).$$

Since efficiency $\psi(r)$ can never be greater than one, if the parameter $A/B \geq 1.0$, the term $\psi(r) - A/B$ is necessarily zero or negative for every policy r. The normalized cost saving term $s(r)$ is then negative or zero no matter what control policy r is chosen. In other words, when $A/B \geq 1.0$, it does not pay to control the process, and the optimal policy is "never investigate" (*i.e.*, $\pi_1(r)=0$ and $\psi(r)=1.0$), which also happens to be a Markovian policy. Thus, cost situations for which the parameter A/B is equal to or greater than one are uninteresting for purposes of cost comparisons.

It is easy to show that, whatever be the observability characteristics of a cost-generating process, there always exists a negative number $n < -1.0$ such that, for all $A/B \leq n$, the optimal policy is "always investigate" (*i.e.*, $\pi_1(r)=1.0$ and $\psi(r)=0$), which also happens to be a Markovian policy. Thus, cost situations for which the parameter A/B is much smaller than -1.0 are also uninteresting for purposes of cost comparisons.

Research Design

First consider the choice of the derived parameter A/B. In view of the above discussion, matters are interesting when the parameter A/B is less than one but not too much less than -1.0. We suppose a good place to make a detailed comparison is with A/B in the neighborhood of zero. Accordingly, we will take $A/B = 1/9$ ($g=0.9$, $I=20$, $K=0$, $\mu_2-\mu_1=20$, yielding $A=2$ and $B=18$). The comparison under alternative values of A/B will be studied as a question in *sensitivity analysis* on either side of zero by setting the investigation cost $I=10$ and 40, respectively, and leaving all else the same. The corresponding values of A/B are $-8/9$ and $+11/18$.

Next consider the choice of the transition probability, g, and the cost distribution functions, F_1 and F_2, which, together, govern the observability of the cost-generating process. As indicated earlier, it is essential to expose the policies systematically to a wide range of imperfectly observable cost situations. Toward this end, we will arbitrarily fix the transition probability $g=0.9$, considering an alternative value of $g=0.7$ as a question in sensitivity analysis. We will take the in-control and out-of-control costs as *normally distributed* with means $\mu_1=100$ and $\mu_2=120$. (The absolute levels of μ_1 and μ_2 are arbitrary for they do not affect the expected cost saving $S(r)$).[11]

We will allow the statistical variance of the costs to range over five values: 5, 10,

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[11] Our choice of $\mu_1=100$ in this paper was not entirely arbitrary. We spent a lot of computing funds in solving dynamic programs with $\mu_1=0$, and found that the program required a finer integration interval for the solution to converge within the specified tolerance. We settled on $\mu_1=100$ to save on computing funds. Incidentally, the choice of μ_1 has no effect on the computing cost for the Dittman-Prakash policy.

15, 20, and 30. Again, the absolute values of the dispersions are not relevant in themselves. What matters is how large the dispersions are *relative* to the mutual separation of the costs, $\Delta\mu$. For instance, all else remaining the same, the cost situation in which both the in-control and out-of-control costs have a statistical variance of five and mutual separation of 20, is as imperfectly observable as the one in which both statistical variances are equal to 10 and mutual separation is equal to 40. This motivates the following definition.

Coefficient of Intrusion.[12] [Prakash, 1976]. For each of the two cost distributions, in-control and out-of-control, the *coefficient of intrusion*, δ, is defined as the ratio of the statistical variance of the cost to their mean difference, *i.e.*,

$$\delta_i = \frac{\sigma}{\Delta\mu} (i = 1, 2).$$

For each cost, the coefficientof intrusion measures the uncertainty of the cost *relative* to the mutual separation of the two costs.

The research design calls for each coefficient of intrusion, δ_1 and δ_2, to range over five values: 0.25, 0.5, 0.75, 1.00, and 1.50, giving a total of 25 combinations. Figure 1 below, which is approximately to scale, gives a visual picture of the variety of cost situations spanned by this research design.

For example, the combination $(\delta_1, \delta_2) = (0.25, 0.25)$ represents cost situations in which each cost distribution is centered four standard deviations away from the mean of the other. This is a reasonably small intrusion of each cost distribution into the other. The combination (0.5, 0.5) represents cost situations in which each cost distribution is centered just two standard deviations away from the mean of the other, resulting in a somewhat greater intrusion of each into the other. The combination (0.25, 1.50) represents cost situations in which the out-of-control cost is centered $4.0\sigma_1$ away from the mean of the in-control cost, while the in-control cost is centered only $0.67\sigma_2$ away from the mean of the out-of-control cost. Thus, the in-control cost distribution (which is relatively peaked) does not intrude much into the out-of-control cost, but the out-of-control cost distribution (which is relatively flat) intrudes quite a lot into the in-control cost. The combination (1.50, 0.25) represents the symmetrically opposite cost situations. And the combination (1.50, 1.50) represents cost situations with a very high intrusion of the equally dispersed in-control and out-of-control costs into each other. More specifically, with this combination, each cost distribution is centered only 0.67 standard deviations away from the mean of the other.

When conducting sensitivity analysis, it will suffice to evaluate the opportunity cost of Dittman-Prakash policy only in the four corner cells of the (δ_1, δ_2) matrix. As we will see later, this pruning represents a saving of several hundred dollars in computing costs—almost entirely related to the computation of the dynamic program solutions for the optimal control.

COMPARISON OF POLICIES

The comparison of the long-run expected cost per period for Dittman Prakash policy (x^*-policy) *vis-à-vis* optimal policy (q^*-policy) is presented in terms of the expected cost saving $S(r) = \{B\psi(r) - A\}\pi_1(r)$ for the following cost situations:

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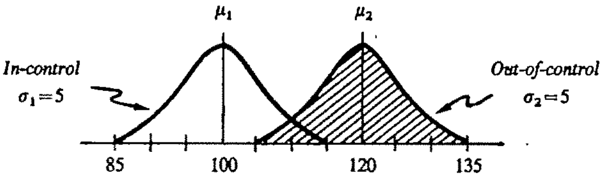
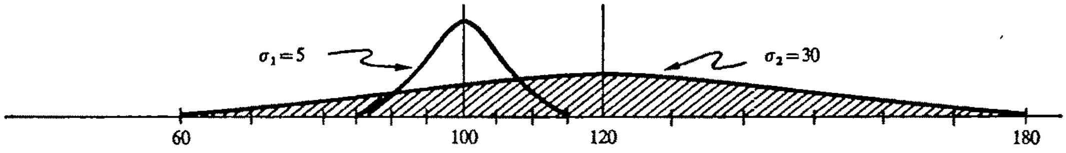
[12] No doubt, the reader will notice the formal similarity of this construct to the usual *coefficient of variation* or *coefficient of dispersion* of a probability distribution—defined as σ/μ where σ is the standard deviation and μ is the mean of the distribution.

FIGURE 1

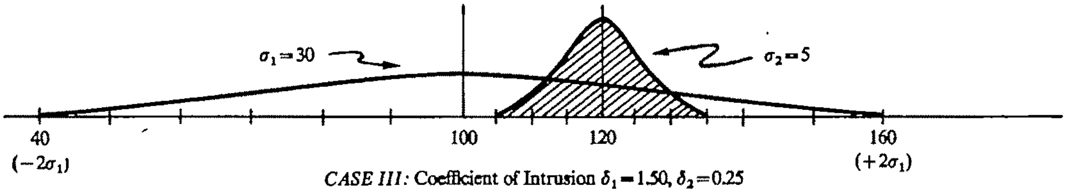
THE RANGE OF IMPERFECT OBSERVABILITY COVERED BY THE RESEARCH DESIGN



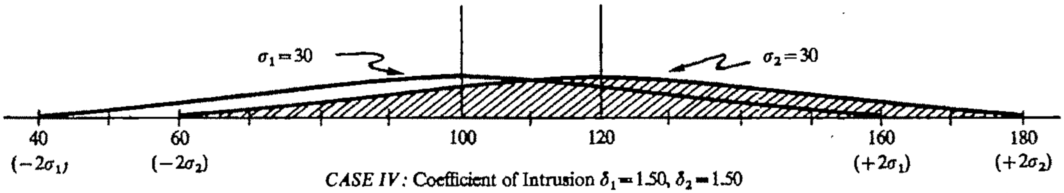
CASE I: Coefficient of Intrusion $\delta_1=0.25$, $\delta_2=0.25$



CASE II: Coefficient of Intrusion $\delta_1=0.25$, $\delta_2=1.50$



CASE III: Coefficient of Intrusion $\delta_1=1.50$, $\delta_2=0.25$



CASE IV: Coefficient of Intrusion $\delta_1=1.50$, $\delta_2=1.50$

(1) Basic Comparison (Table 1): All 25 cells of the (δ_1, δ_2) matrix, with $g=0.9$, and $A/B=1/9$ ($I=20$, $K=0$, $\mu_2-\mu_1=20$, $\mu_1=100$, and F_1 and F_2 normal distributions).

(2) Sensitivity with respect to A/B (Table 2): The four corner cells of the (δ_1, δ_2) matrix, with everything else the same as in Table 1, except A/B, which has values $-8/9$ and $+11/16$—obtained, respectively, by setting $I=10$ and 40.

(3) Sensitivity with respect to g (Table 3): The four corner cells of the (δ_1, δ_2) matrix, with everything else the same as in Table 1, except g, which is changed to 0.7 (resulting in a change of A/B to $+3/7$).

Calculation Procedures—Dittman-Prakash Policy

For a Markovian control with an arbitrary critical cost x, Dittman and Prakash [1978] show that the long-run expected cost per period is given by Equation (2) with

$$\left.\begin{aligned}\pi_1(x) &= \frac{1-F_2(x)}{1-gF_2(x)};\\ \psi(x) &= F_1(x).\end{aligned}\right\} \tag{3}$$

TABLE 1

OPPORTUNITY COST OF MARKOVIAN CONTROL

Parameters: $g=0.9$, $I=20$, $K=0$, $\Delta\mu=20$, so that $A/B=1/9$.

(Cost saving under perfect information = 16.0)

Data in each cell: Cost saving with the optimal control
Cost saving with Dittman-Prakash policy
Opportunity cost of Dittman-Prakash policy

	$\delta_2=0.25$	0.50	0.75	1.00	1.50
$\delta_1=0.25$	15.784 15.778 0.006	15.456 15.438 0.018	15.238 15.211 0.027	15.184 15.064 0.120	15.292 14.905 0.387
0.50	14.745 14.546 0.199	14.453 14.319 0.134	14.301 14.210 0.091	14.249 14.177 0.072	14.456 14.183 0.273
0.75	14.110 13.234 0.876	13.571 13.055 0.516	13.409 13.099 0.310	13.378 13.200 0.178	13.588 13.408 0.180
1.00	14.012 12.060 1.952	13.270 11.957 1.313	12.835 12.086 0.749	12.711 12.274 0.437	12.824 12.641 0.183
1.50	14.105 10.514 3.591	13.348 10.423 2.925	12.719 10.567 2.152	12.269 10.795 1.474	11.910 11.293 0.617

TABLE 2

SENSITIVITY ANALYSIS WITH RESPECT TO A/B

Parameter changes: $I=10$, so that $A/B=-8/9$

(Cost saving under perfect information = 17)

	$\delta_2=0.25$	1.50
$\delta_1=0.25$	16.832 16.829 0.003	16.320 15.894 0.426
1.50	15.483 13.962 1.521	13.773 13.431 0.342

$I=40$, so that $A/B=+11/18$

(Cost saving under perfect information = 14)

	$\delta_2=0.25$	1.50
$\delta_1=0.25$	13.734 13.731 0.003	13.317 12.967 0.350
1.50	11.888 4.773 7.115	9.331 8.340 0.991

A standard optimization routine[13] was used to obtain, for each cost situation, the critical cost x^* minimizing the long-run expected cost per period $C(x^*)$ over all x. Then the expected cost saving equals $\mu_2 - C(x^*)$. For each case, the computer output also included the values of the effectiveness $\pi_1(x^*)$, and efficiency $\psi(x^*)$, and critical cost x^* expressed as the standardized variate

$$z^* = \frac{x^* - \mu_1}{\sigma_1}.$$

These values are reported in Tables 4–6.

To give the interested reader an idea of the order of magnitude of the computing costs involved under the Dittman-Prakash policy, it took us less than two minutes of CPU time to solve all 37 cost situations reported in this paper.

Calculation Procedure—Optimal Policy

No explicit formula is known for the long-run expected cost per period under Bayesian control with arbitrary critical probability q. One numerical method, due to Girshick and Rubin [1952], calls for the solution of integral equations. However, an easier calculation to determine the optimal control is afforded by an obvious adaptation of the approach of Kaplan [1969].

Kaplan [1969] formulates a dynamic program to calculate for any cost situation the critical probability q^o, minimizing over all values of $q \in [0, 1]$ the discounted expected cost for an infinite planning horizon. The dynamic program is solved for the critical probability q_n^o for periods $n = 1, 2, \cdots$, counted back from terminal time. The procedure is stopped when the value of q_n^o in successive periods stabilizes.

TABLE 3

SENSITIVITY ANALYSIS WITH RESPECT TO g

Parameter changes: $g = 0.7$, so that $A/B = 3/7$

(Cost saving under perfect information = 8)

	$\delta_2 = 0.25$	1.50
$\delta_1 = 0.25$	7.756 7.751 0.005	7.091 6.595 0.496
1.50	5.971 3.600 2.371	4.420 3.824 0.596

If, in Kaplan's optimality function, the discount factor α is set equal to 1.0, then the optimal value C_n^o of the optimality function is clearly the *aggregate* expected cost for exactly n periods of controlled operation to termination ($n = 1, 2, \cdots,$). Further, $\Delta C_n^o = C_n^o - C_{n-1}^o$ is the optimal expected cost for the nth period's operation (counted back from the terminal time). The iterations are continued until both q_n^o and ΔC_n^o stabilize. (In most cost situations reported in this paper, both values stabilized in eight to twelve iterations.) The stable q_n^o is the critical probability q^* of the optimal control (minimizing the long-run expected cost per period), and the corresponding ΔC_n^o is the long-run expected cost per period $C(q^*)$.

Unfortunately, the above procedure does not yield the values of the effectiveness and efficiency of the optimal control. We know of no other way for calculating the effectiveness and efficiency of Bayesian control besides solving the integral equations of Girshick and Rubin [1952]. This we shall not undertake to do here, for considerations of effectiveness and efficiency are outside the scope of this study.

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[13] We developed our own computer program for an optimization routine based on the method of golden section [Wagner, 1969, pp. 525–526]. Since the computing time was less than five seconds per case, we did not think it would be worthwhile to look for more efficient programs.

TABLE 4

(OPTIMAL) CRITICAL COST IN DITTMAN-PRAKASH POLICY

$$z^* = \frac{x^* - \mu_1}{\sigma_1}$$

Parameters: $g=0.9$, $A/B=1/9$

		$\delta_2=0.25$	0.50	0.75	1.00	1.50
$\frac{\Delta\mu}{\sigma_1} = 4.00$	$\delta_1 = 0.25$	2.569	2.435	2.444	2.479	2.651
2.00	0.50	1.681	1.752	1.852	1.945	2.098
1.33	0.75	1.205	1.318	1.448	1.567	1.763
1.00	1.00	0.921	1.031	1.162	1.287	1.499
0.67	1.50	0.611	0.692	0.800	0.911	1.119

Parameters: $g=0.9$, $A/B=-8/9$

	$\delta_2=0.25$	1.50
$\delta_1 = 0.25$	2.391	2.275
1.50	0.510	0.791

Parameters: $g=0.9$, $A/B=+11/18$

	$\delta_2=0.25$	1.50
$\delta_1 = 0.25$	2.755	2.840
1.50	0.752	1.439

Parameters: $g=0.7$, $A/B=3/7$

	$\delta_2=0.25$	1.50
$\delta_1 = 0.25$	2.420	3.362
1.50	0.582	1.024

The dynamic program solution procedure, although somewhat lengthy, is readily programmed for electronic computation. The interested reader can get an idea of the order of magnitude of the computation costs (excluding program development effort[14]) from the fact that it took us more than 70 minutes of CPU time to solve all 37 cost situations reported in this paper.

DISCUSSION OF RESULTS

We now look for significant patterns in the tabulated results. Since our data-points span a wide domain of cost situations, it should be possible to obtain some generalizations concerning the op-

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[14] Developing the computer routine to solve the dynamic program took a lot of effort. The stability of the solution is sensitive to the overall accuracy of each iteration. We made several test runs to settle such computational parameters as the integration domain ($\pm 6\,\sigma$), grid size on the domain of the optimality function (.01), integration tolerance on the computer routine using Simpson's rule (.001), and the rule for terminating the dynamic program (ΔC^* stabilizing in the third decimal place). We will be happy to make our programs available to any interested reader.

TABLE 5

EFFECTIVENESS OF DITTMAN-PRAKASH POLICY

Parameters: $g = 0.9$; $I = 20$; $K = 0$; $\Delta\mu = 20$; $A/B = 1/9$.

	$\delta_2 = 0.25$	0.50	0.75	1.00	1.50
$\delta_1 = 0.25$	.992	.973	.959	.949	.936
0.50	.966	.937	.921	.913	.905
0.75	.949	.912	.893	.883	.876
1.00	.943	.901	.876	.863	.854
1.50	.945	.898	.908	.847	.818

TABLE 6

EFFICIENCY OF DITTMAN-PRAKASH POLICY

Parameters: $g = 0.9$; $I = 20$; $K = 0$; $\Delta\mu = 20$; $A/B = 1/9$.

	$\delta_2 = 0.25$	0.50	0.75	1.00	1.50
$\delta_1 = 0.25$	.995	.993	.993	.993	.995
0.50	.954	.960	.968	.974	.986
0.75	.886	.906	.926	.942	.961
1.00	.821	.849	.884	.901	.933
1.50	.729	.758	.787	.819	.884

portunity cost of Dittman-Prakash policy (*i.e.*, the best Markovian control). Of course, in the absence of an analytic expression for the opportunity cost, one cannot be sure that there are no discontinuities or singularities at intermediate points in the domain. All we can say is, we have no reason to believe so. Having noted this *caveat*, we will proceed to draw the generalizations—indicating *inter alia* what patterns came to us as somewhat of a surprise.

Equally Dispersed In-control and Out-of-control Costs

First consider the cost situations in which both the in-control and out-of-control costs are equally dispersed and, so, have equal coefficients of intrusion (see the right diagonal cells in Tables 1–6).

(1) For situations with small coefficients of intrusion, the opportunity cost of (the best) Markovian control is an insignificant fraction of the mean difference between the in-control and out-of-

control costs. For instance, in the cell (0.25, 0.25) of Table 1, the opportunity cost is a mere 0.03 percent of the mean cost differential of 20. The opportunity cost remains insignificant for a wide range of values of the derived parameter A/B (see Table 2) as well as the deterioration rate (see Table 3).[15] To appreciate the significance of these results, consider the following numerical example:

Expected in-control cost = \$1,000,000 per period
Expected out-of-control cost = \$1,200,000 per period
Standard deviation for each cost = \$ 50,000
Investigation cost = \$ 200,000 per investigation
Correction cost = NIL
Probability of deterioration = 10% per period

In the above cost situation, the mean cost difference between the two states is \$200,000, so that the coefficient of intrusion for both costs is 0.25 (=50,000 ÷ 200,000). From Table 1, the opportunity cost of Markovian control in this situation is only \$60 per period. Moreover, Tables 2 and 3 show that the opportunity cost remains below \$60 per period with the cost per investigation ranging from \$100,000 to \$400,000, or with the deterioration rate becoming as high as 30 percent.

The insignificance of the opportunity cost as well as its robustness with respect to changes in the investigation cost and deterioration rate comes to us as somewhat of a surprise.

(2) The right diagonal cells from (0.25, 0.25) to (1.5, 1.5) in Tables 1–3 show that the opportunity cost of Markovian control increases with an increase in the coefficients of intrusion. However, even when the coefficients of intrusion are as high as 1.5, the opportunity cost remains less than five percent of the mean cost differential. At this extreme, the opportunity cost is somewhat sensitive to changes in the derived parameter A/B, but not to changes in the deterioration rate.

For illustration, consider again the foregoing numerical example, except now let the standard deviation of each cost be \$300,000. Then, each coefficient of intrusion is 1.5. From Table 1, the opportunity cost of Markovian control in this case is \$6,170 per period; it is \$3,420 per period when the cost per investigation is \$100,000 and \$9,910 per period when the cost per investigation is \$400,000 (Table 2).

In considering hypothetical situations, it is important not to lose perspective. When mutual separation of costs is \$200,000, a standard deviation of \$300,000 is a lot of uncertainty. In practice, one would try to reduce the uncertainty of the in-control cost, particularly when the investigation cost is as high as \$400,000. In any case, it is surprising that the opportunity cost of Markovian control even in such a severe case is small, and not sensitive to changes in the deterioration rate.

In-Control Cost Less Dispersed than the Out-of-Control Cost

Next consider the cost situations in which the in-control cost is less dispersed than the out-of-control cost (see the cells above the right diagonal in Tables 1–6). We suspect that such situations are relatively more common in practice because "out-of-control" is a catch-all label and so collects greater uncertainty.

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[15] We should reiterate that whenever any parameter is changed, the optimal values of the critical cost and critical probability must be recomputed, and the opportunity cost determined using these new values.

(1) For situations in which the out-of-control coefficient of intrusion exceeds the in-control one by no more than 0.25, the opportunity cost of Markovian control is less than one percent of the mean cost differential. The opportunity cost remains less than 2.5 percent of the mean cost differential even when the out-of-control coefficient of intrusion is much larger than the in-control one (see cell (0.25, 1.50) in Tables 1–3). The opportunity cost is not particularly sensitive to changes in the derived parameter A/B (see Table 2), or the deterioration rate (see Table 3).

It came to us as a surprise that the opportunity cost of Markovian control is small even in the corner cell (0.25, 1.50), where the in-control cost has a low level of uncertainty and the out-of-control cost has a high level of uncertainty. We would have thought that in such extreme situations, the more efficient utilization of information by the optimal control would entail a high opportunity cost for Markovian control.

(2) Perhaps the most counter-intuitive finding of this study is that, irrespective of the uncertainty of the in-control cost, the opportunity cost of Markovian control *decreases* as the uncertainty of the out-of-control cost is *increased* to a level somewhat greater than that of the in-control cost; beyond this point, the trend reverses. (See the rows in Table 1).

Why does the performance of Markovian control come *closer* to the optimal performance as more uncertainty is introduced in the out-of-control cost? Why does this pattern reverse beyond a certain point? For now, we have no definitive answer. Tables 5 and 6 show that, as more uncertainty is introduced in the out-of-control cost, the effectiveness of Markovian control deteriorates steadily, while its efficiency improves, *i.e.*, proportionately less Type I errors are made. This implies that the cost saving $S(x^*) = \{B\psi(x^*) - A\}\pi_1(x^*)$ goes through a peak, which might explain why the opportunity cost goes through a dip. But, for now, this avenue will not be explored further, because data on the effectiveness and efficiency of optimal control are not available.

In-control Cost More Dispersed than the Out-of-control Cost

Consider now the cost situations in which the in-control cost is more dispersed than the out-of-control cost (see the cells below the right diagonal in Tables 1–6).

(1) For situations in which the coefficients of intrusion do not exceed 0.75, the opportunity cost of Markovian control is less than four percent of the mean cost differential.

(2) For situations in which the in-control coefficient of intrusion is greater than 0.5, and exceeds the out-of-control coefficient of intrusion by 0.5 or more, the opportunity cost of Markovian control is seven to 35 percent of the mean cost differential (see Table 1). Furthermore, the opportunity cost increases substantially with an increase in the value of the derived parameter A/B (see Table 2); it increases only moderately with an increase in the deterioration rate (see cells (1.5, 0.25) in Tables 1–3).

This result requires an explanation. Once again, we do not have a definitive answer. The frequency of cost signals from the in-control state is significantly larger than from the out-of-control state. Hence, Markovian control should make many more Type I errors when, of the two costs, it is the in-control cost that has a larger dispersion rather than the other way around. We should, therefore, see somewhat greater effectiveness but very much smaller efficiency for Markovian control in the corner cell (1.50, 0.25) than in the symmetrically opposite corner cell (0.25, 1.50). Tables 5 and 6 show that such is indeed the case, which might explain the large size of the opportunity cost in the cell (1.50, 0.25). Again, we cannot now explore this avenue further, because the effectiveness and efficiency data for optimal control are not available.

Sensitivity with Respect to the Derived Parameter A/B *and Transition Probability* g

The observations relating to sensitivity can now be collected together.

(1) The opportunity cost of Markovian control changes in the same direction as the change in the derived parameter A/B. This sensitivity is prominent in the cells "close" to the corner cell (1.50, 0.25); it is not so noticeable in the right diagonal cells and cells above the diagonal (compare Tables 1 and 2).

(2) The opportunity cost of Markovian control changes in a direction opposite to the change in the transition probability g. However, the sensitivity is moderate to small in all cells. Much of the change in opportunity cost due to changes in g is probably explained by the attendant change in the value of the derived parameter A/B. One could attempt an elaborate factor analysis of the various effects; but we do not believe that this is worth the effort.

Comments on Standardized Critical Cost

Table 4 reports the standardized value of the optimal critical cost for all situations considered in Table 1. It is worthy of note that the values range approximately from $0.6\sigma_1$ to $2.7\sigma_1$. (*N.B.* The values are related to the standardized position of μ_2 on the in-control cost distribution, *i.e.*, to the inverse of the coefficient of intrusion δ_1.) An important implication is that the classical rule, by which control limits are set at a distance of $2\sigma_1$ or $3\sigma_1$ from the mean in-control cost cannot be trusted to provide "good enough" control.

CONCLUSION

Summary of Results

This study leads to two basic findings:

(1) The opportunity cost of the best Markovian control (Dittman-Prakash policy) is a small fraction of the mean difference between the in-control and out-of-control costs unless the in-control cost has at least a moderately large coefficient of intrusion and a substantially greater dispersion than the out-of-control cost.

(2) The opportunity cost of the Dittman-Prakash policy *decreases* as the level of the uncertainty of the out-of-control cost increases to a value somewhat higher than the level of uncertainty of the in-control cost; beyond this point the trend reverses.

Limitations and Further Directions

To criticize this study, for a start, one could make all the usual comments: The model is too simplistic for it admits only two states of operation when, in reality, the states of operation constitute a continuum; the model contains no provision for the process correcting itself or suffering an irreversible shift, or for the transition probability changing with time; the model assumes that the cost reports are issued at fixed intervals whose duration is exogenously determined, whereas, in practice, an important part of the control problem is to decide when the next report shall issue; the model provides the manager with only one choice—whether a fixed investigation cost should be incurred for obtaining perfect information—whereas, in practice, the problem is to decide how much investigation cost should be incurred so as to obtain the corresponding degree of partial information; *etc.*

Criticisms such as the above miss the whole point of this study. The question we seek to answer is: *Given* the particular model, what is the opportunity cost of (the best) Markovian control? This objective is accomplished by the study, but not without some limitations arising mainly because an explicit analytic expression for the opportunity cost of a Markovian control is not known. The study uses numerical methods (which should be distinguished from simulation) and is limited to normal distributions.

Even so, the study has both practical and theoretical value. On the practical side, it compactly tabulates information permitting a quick estimation of the cost implications of Markovian control (*vis-à-vis* the optimal control). A sizable computation cost has gone into generating this information, which makes it all the more valuable for those who might need it.

On the theoretical side, the study makes two contributions. First, the methodological discussion in Section 1 is interesting in its own right. It lays down a basis for the research design of studies on cost management, using numerical methods or simulation, or requiring empirical data. Secondly, the study yields general conditions under which the cost performance of Markovian control is not materially worse than that of the optimal control. This observation provides a basis for further analytical and empirical research.

For instance, some interesting analytical questions motivated by the study are: How robust is the comparative performance of the two policies with respect to parameter mis-estimation? How do the two policies compare with respect to other performance indicators, such as the statistical variance of per-period cost? How does the performance comparison alter when the policies derived for the two-state Markov chain model are used in situations whose states of operation constitute a continuum?

Among the empirical questions motivated by the study are the following: What is the attitude of practitioners towards a fixed-critical-cost policy (Markovian control) versus a fixed-critical-probability policy (Bayesian control), and what are the determinants of their attitude? What is the relative incidence of situations in which the in-control cost has at least a moderately large coefficient of intrusion and a substantially greater dispersion than the out-of-control cost? To what extent do alternative control styles (Markovian versus Bayesian) affect the parameters of the cost process—for instance, due to a change in the behavior of those being controlled? (Note that were the answer to the last question known, the data provided in this paper would enable one to readily estimate the opportunity cost of Markovian control after allowing for a *mutatis mutandis* change in parameters of the cost process.)

In conclusion, we believe that the above program of research points a more promising direction for gaining a good understanding of the cost management problem, and for arriving at solutions having practical usefulness.

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THE ACCOUNTING REVIEW

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Issue	*Completed Manuscript to Typesetter*	*Galleys for Proofreading*	*Galleys to Printer*
January	September 1	October 15	November 1
April	December 1	January 15	February 1
July	March 1	April 15	May 1
October	June 1	July 15	August 1

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Notes

Investor Trading Responses to Differing Characteristics of Voluntarily Disclosed Earnings Forecasts

Donald R. Nichols, Jeffrey J. Tsay, and Paula D. Larkin

ABSTRACT: The purpose of this study is to investigate whether the information content of executive earnings forecasts, as measured by changes in trading activity, differed depending on (1) the forecast horizon and (2) the magnitude of the predicted earnings change. The results of the study indicate that the information content of shorter term and longer term forecasts was virtually the same. With respect to the magnitude of the predicted earnings change, the results indicate that predictions of relatively large changes in earnings (greater than 40 percent) were associated with large changes in trading activity. However, no statistically significant relation between predicted earnings change and changes in trading activity was observed.

PUBLIC disclosure of management-generated forecasts of accounting information, particularly earnings, has been a topic of concern for a number of years. One means of assessing potential investor interest in internal estimates of earnings is to investigate investor reactions to current, voluntarily disclosed executive forecasts. If the disclosure of an executive forecast appears to cause an investor response through market adjustment of equilibrium security prices and/or changes in the amount of investor activity as manifested in observable changes in trading volume, then the forecast may be interpreted to be information of interest to investors. The purpose of this study is to investigate whether the information content of executive forecasts of earnings appears to vary for forecasts with differing characteristics. There have been several recent studies providing evidence on security price reaction to executive forecasts or their surrogates.

Patell [1976] investigated stock return reaction related to executive earnings forecasts that were voluntarily disclosed during 1963–68 and concluded that there was a significant price reaction associated with an executive forecast announce-

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ment. However, almost one-half of the forecasts were accompanied by quarterly earnings reports in the same announcement, and these or other news may have influenced his results. In related studies, Foster [1973] investigated the information content of preliminary estimates of earnings, and Gonedes, Dopuch, and Penman [1976] utilized analysts' forecasts as proxies for executive forecasts; however, the transferability of their findings concerning analysts' forecasts to executive forecasts is not completely clear.

METHODOLOGY AND HYPOTHESES

If the securities market is efficient in the semi-strong sense, then a firm's security price at any point in time reflects all public information available about the firm at that point in time. If observable amounts of portfolio adjustments occur in the period in which the executive forecast is announced, the announcement can be said to have information content. The previously mentioned studies have utilized return reaction as an indicator of information content. Some comments on the propriety and potential problems of utilizing return reactions may be found in Downes and Dyckman [1973] and Dyckman, Downes and Magee [1975]. Another possible indicator of information content, and the one we chose to utilize, is volume reaction. Some discussion of the relation between trading activity and price movements may be found in Crouch [1970] and Ying [1966]. Theoretical expositions on the relation between trading activity and information content may be found in Beaver [1968], Epps [1975] and Downes and Dyckman [1973]. Crouch [1970] presents *a priori* arguments that significant amounts of portfolio adjustments may occur in the absence of significant changes in price, although there is evidence that price and trading volume changes are likely to be correlated [Crouch, 1970 and Ying, 1966].

Trading Volume Variables

Several variables were used in the analyses as measures of trading activity. The primary variable was V_{it}, described in Beaver [1968], which is the percent of outstanding shares traded during a particular week adjusted by the number of trading days during the week (multiplied by 100 in the tables for convenience).

It is possible that the volume of trading in a specific firm's security may be influenced by the overall volume of securities traded on that day. In order to factor out any effects of changes in the level of trading in the market, adjustments of V_{it} were made, assuming a proportional influence on a security's trading volume from overall market volume. The adjustments made practically no difference on the results obtained from the analysis of the unadjusted volume data; however, the tables contain the unadjusted and adjusted volume data.

A sample of firms, described in the following section, for which executive forecasts of earnings were reported in *The Wall Street Journal* (*WSJ*) was identified. Executive forecasts in the *WSJ* usually refer to expected earnings per amount or expected changes in dollars or percentage terms. All forecasts included in this study were converted into expected per share amounts, and the term "earnings" refers to these earnings per share amounts. Volume data for the common stock of each company in the sample were collected for the week of the forecast announcement and the eight surrounding weeks from Standard and Poor's I.S.L. *Daily Stock Index*. Large block transactions (*i.e.*, 20,000 or more shares) were identified in *Barron's* and eliminated from the data. The weeks were designated with the consecutive numbers −8 to 8, with the week of the forecast announcement designated as week zero.

The relative magnitude of the associated trading activity to the executive forecast was of interest, and the following variable, measuring the relative change in volume occurring in week zero, was computed:

$$\Delta V_i = (V_{i0} - \overline{V}_i)/\overline{V}_i$$

where:

$\overline{V}_i$ = the average trading volume for company i for the 16 week period period surrounding week zero.

Hypotheses

Three specific null hypotheses were proposed and tested to investigate several issues.

> *H1.* There is no significant difference between the trading activity during the announcement week and the trading activity during 16 weeks surrounding the announcement week.

If announcements of executive forecasts of earnings have informational significance to investors causing increases in trading activity, then the null hypothesis would be rejected.

> *H2.* There is no significant difference between the magnitude of the change in volume associated with a longer term forecast and a shorter term forecast.

The purpose of hypothesis two was to investigate whether the information content of longer term forecasts and shorter term forecasts is the same.

> *H3.* There is no significant difference in the trading activity associated with forecasts of larger expected changes in earnings and forecasts of smaller expected changes in earnings.

The purpose of Hypothesis 3 was to investigate whether forecasts predicting larger changes in earnings are associated with greater trading activity than forecasts predicting smaller changes, and to investigate an issue raised by Patell [1976, p. 274]. It is not clear from previous studies whether observed price reaction is associated with the act of voluntary disclosure or the forecast number; if the latter is the case, then the association between the magnitude of the forecasted earnings change and investor reaction may be investigated.

SAMPLE SELECTION AND DATA ANALYSIS

The sample included all executive forecasts of annual earnings reported in *The Wall Street Journal* during 1971–73 that we could discover and which met the criteria described below.

1. The forecast must be an estimate of annual earnings.
2. The forecast must allow the determination of a specific dollar figure estimate either a dollar amount or a percentage change from the previous year's earnings.
3. The forecast must be announced at least three months prior to the end of the company's fiscal year. This requirement was included so that the forecasts in the sample would cover a sufficient length of time to constitute a forecast of earnings, rather than be an essentially preliminary report on a fiscal year almost completed.
4. A forecast was omitted from the sample where any of the following "news" was reported in the *WSJ*: annual or quarterly earnings within a week of the date the forecast, a stock split within eight weeks on either side of the date of the forecast, or a cash dividend within the week of the forecast. This requirement was necessary so that the analysis would not be clouded by reaction to these other types of "news."

A total of 74 forecast announcements met the criteria for inclusion in the sample, and a list of the companies and the announcement dates can be obtained from the authors.

Volume Reaction in the Week of the Announcement

The first issue of interest was the determination of investor reaction, if any, to the announcements of executive forecasts of earnings in the sample. Table 1 contains the average weekly V_t of the 74 announcements in the sample for each of the 17 weeks studied. As shown, the highest average weekly volume occurred in week zero for both the unadjusted and adjusted figures; however, for convenience only the adjusted figures will be discussed. The V_t for week zero was 1.67 compared to an average V_t for the 16 weeks excluding week zero of 1.30. In order to test the significance of the individual company company increases in volume in week zero, a nonparametric test, the Kolmogorov-Smirnov (K-S) test was used. The null hypothesis (*H1*) tested was that there was no significant difference between the ranking of trading activity during the announcement week and the trading activity during the 16 weeks as measured by the relative ranking of trading activity for each firm in week zero. The observed D was .218, indicating that the week-zero ranking frequency distribution of the sample differs significantly from the uniform distribution at the .01 level ($D = .1895$), and thus the null hypothesis (*H1*) was rejected. It appeared that significant increases in trading activity occurred in the week in which the forecast was announced.

TABLE 1

AVERAGE V_t FOR THE SEVENTEEN WEEK PERIOD

Week	*Average Weekly Volume*	
−8	.129	.123*
−7	.129	.125
−6	.145	.145
−5	.122	.120
−4	.119	.119
−3	.131	.131
−2	.140	.143
−1	.146	.147
0	.162	.167
1	.124	.124
2	.124	.129
3	.118	.118
4	.130	.132
5	.128	.129
6	.142	.140
7	.120	.124
8	.131	.135
16 week average (excluding week 0)	.130	.130*
Volume increase in week 0 compared to 16 week average	25%	28%

* Adjusted

Magnitude of Reaction and Length of Forecast Period

The second issue of interest was the relationship between the amount of investor reaction and the length of period covered by the forecast. Table 2 contains the average V_t for each week of the 17 weeks for three groups (classified by quarters) of forecast duration. As shown, the increases in V_t during week zero relative to the 16 week average were 10 percent, 36 percent and 50 percent for the groups 3 to 6 months, 6 to 9 months, and 9 to 12 months, respectively.

Again a K-S test was used to test the significance of the volume reaction in period zero for the three groups. The null hypothesis of no difference between the observed and expected frequency distributions for each group could be rejected at the .05 level of significance for the 3-to-6 month and the 9-to-12 month forecasts and at the .10 level for the 6-to-9 month forecasts. Thus, it appeared that increased trading activity accompanied executive forecasts for each of the three groups classified by the length of forecast period. This indicates increased

TABLE 2

AVERAGE V_t FOR THE SEVENTEEN-WEEK PERIOD CLASSIFIED BY LENGTH OF THE FORECAST PERIOD

	Length of Forecast Period					
	3–6 mo.		*6–9 mo.*		*9–12 mo.*	
Week	*n=24*		*n=41*		*n=9*	
−8	.118	.123*	.146	.131*	.080	.091*
−7	.134	.142	.134	.123	.096	.093
−6	.124	.130	.166	.162	.109	.104
−5	.113	.112	.121	.119	.148	.147
−4	.116	.115	.119	.118	.123	.136
−3	.102	.101	.138	.134	.174	.191
−2	.144	.162	.146	.136	.104	.126
−1	.153	.159	.137	.134	.170	.173
0	.139	.146	.172	.173	.174	.200
1	.144	.154	.107	.109	.144	.116
2	.104	.109	.133	.137	.138	.142
3	.132	.127	.99	.104	.168	.154
4	.121	.123	.119	.126	.204	.186
5	.147	.146	.104	.110	.183	.165
6	.156	.148	.133	.136	.143	.136
7	.148	.140	.105	.116	.115	.116
8	.137	.128	.128	.140	.134	.137
16 week average (excluding week 0)	.131	.133*	.127	.127*	.140	.138*
Volume increase in week 0 compared to 16 week average	6%	10%	35%	36%	24%	50%

* Adjusted

trading activity in week zero for each of the groups; however, the magnitude of the increase may vary from one group to another. In order to test the latter issue, a Chi square test of independence of classification was applied to the frequency distribution of ranks of each of the three groups for week zero, and no significant difference in the frequency distribution of the ranks was detected. Finally, a simple regression model was used to test the relation between the amount of change in volume reaction (ΔV_i) and the length of forecast period in months (T). The results of the regression model also did not indicate a significant relationship between the magnitude of the reaction and the length of forecast period. Thus, it was concluded that there was increased trading activity accompanying each of the three duration groups, and that there was no significant relationship between the amount of the change in trading activity and the length of the forecast period.

Volume Reaction and Predicted Earnings Change

The third issue of interest was the relation, if any, between the amount of change in trading activity and the magnitude of the change in earnings from the previous year predicted by the executive. If executive forecasts affect expectations of investors, then it could be theorized that forecasts predicting earnings very

TABLE 3

AVERAGE WEEKLY V_t GROUPED BY AMOUNT OF PREDICTED CHANGE IN EARNINGS PER SHARE

	Change in Forecasted Earnings					
	≤±20%		±21%–±40%		±40%	
Week	*n=37*		*n=18*		*n=19*	
−8	.103	.102*	.155	.144*	.156	.147*
−7	.098	.102	.182	.159	.140	.138
−6	.105	.111	.221	.207	.154	.150
−5	.091	.093	.137	.135	.168	.159
−4	.084	.087	.164	.155	.142	.147
−3	.079	.081	.190	.191	.176	.170
−2	.086	.092	.187	.192	.201	.197
−1	.104	.104	.218	.211	.162	.170
0	.112	.111	.219	.224	.203	.224
1	.103	.103	.147	.150	.142	.14[illegible]
2	.090	.089	.165	.171	.152	.165
3	.088	.087	.113	.119	.182	.176
4	.098	.097	.158	.168	.168	.167
5	.105	.105	.121	.124	.179	.179
6	.132	.123	.123	.134	.177	.177
7	.095	.093	.119	.132	.171	.175
8	.110	.111	.126	.135	.177	.183
16 week average (excludes week 0)	.098	.099*	.158	.158*	.165	.165*
Volume increase in week 0 compared to 16 week average	14%	12%	39%	42%	23%	36%

* Adjusted

different from current investor expectations of earnings would be associated with greater trading activity than forecasts predicting earnings at a level nearer market expectations. In order to test this possibility, a measure of investor expectations of earnings is required. Last year's earnings were selected as a proxy for investor expectations of earnings for the next fiscal year. Although other, more complex models could have been used, the extensive research on extrapolative models for forecastings earnings has not identified a model that is consistently superior to a no change model [Watts and Leftwich, 1977]. As a result, there was no *a priori* reason to expect that other models would provide a better proxy for investor expectations. Table 3 presents the average weekly V_t for each week of the 17 week period with the forecasts classified in three groups based on the absolute value of the forecasted percentage change in earnings. As shown in the table, V_t in week zero was 12 percent greater than the average of the V_t's for the 16 surrounding weeks for forecasts predicting less than or equal to a 20 percent change in earnings per share (EPS). The difference in V_0 and the 16 week average for predicted changes in EPS between 20 and 40 percent was a 42 percent increase, and for predicted changes in EPS greater than 40 percent there was a 36 percent increase. Thus, very large percentage increases in average volume occurred for forecasts predicting earnings changes greater than 20 percent.

The significance of the increase in week zero was tested again using the K-S test. The null hypothesis of no difference between the observed and expected distribution of week zero rankings was rejected at less than the .05 level only for the forecasts predicting a change in earnings greater than 40 percent. We attempted to determine whether the level of trading activity varied with the magnitude of the forecasted change. The Chi square statistic indicated a probability of .1903 and was not significant. This was corroborated by a simple regression model used to determine if there appeared to be a relationship between the increase in volume and the absolute value of the percentage change in earnings per share. Thus, it appeared that there was some relation between magnitude of the forecasted change and the amount of trading activity in week zero; however, the relation was not statistically significant at the .05 level. Significant amounts of trading activity in the announcement week seemed to be associated only with predictions of relatively large changes in earnings.

SUMMARY

The analyses in the previous sections provide evidence about several issues not previously investigated. First, the results of the investigation were consistent with results of previous studies that have found security price response to executive forecasts, in that investors also appear to react with increased trading activity to executive forecasts of earnings. Secondly, the duration of the forecast period did not appear to have any significant relationship to the amount of the increased trading activity. Third, there was some evidence of an association between the absolute value of the percentage change in earnings predicted and the magnitude of related trading activity, although large (over 40 percent) predicted changes in earnings were the primary reason for this finding.

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EDUCATION RESEARCH

Edwin H. Caplan, Editor

A Comparison of Academic and Practitioner Views of Content Levels in the Undergraduate Accounting Curriculum

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ABSTRACT: CPA practitioners and accounting educators are equally interested in the undergraduate accounting curriculum. In 1976, the Committee on Professional Examinations of the American Accounting Association surveyed schools of business to determine the level of content at which 72 topics were being taught in undergraduate accounting programs. This article summarizes a similar survey sent to the 100 largest CPA firms in the United States and compares the results with the AAA survey.

THREE specific groups are interested in the undergraduate accounting curriculum: (1) undergraduate accounting majors, (2) accounting practitioners, and (3) accounting educators. Each group has the common goal of an undergraduate accounting program that adequately prepares accounting majors to enter the profession.

The present undergraduate accounting curriculum has been influenced by *Horizons for a Profession* and the Beamer report. *Horizons for a Profession* [Roy and MacNeill, 1967] was concerned with determining the common body of knowledge to be possessed by those about to begin their professional careers as certified public accountants. This report proposed a curriculum that was designed to produce more broadly educated accountants than in the past. The Beamer Committee report [AICPA, 1969] was a follow-up to the Horizons report and endeavored to assist accounting educators in establishing an accounting curriculum that had both breadth and depth. These reports are frequently mentioned in the context of the current controversy about professional schools of

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accountancy. While we are not directly concerned with that controversy here, it is interesting to note that the academic preparation of accounting majors is an important issue in the arguments both for and against professional schools. However, there is very little empirical evidence with respect to the current content of the accounting curriculum and the views of practitioners about that content.

PURPOSE OF THIS RESEARCH

The research reported here is an extension of the research undertaken by the American Accounting Association Committee on Professional Examinations [1976]. This Committee identified 72 topics, separated into 12 categories, commonly discussed in accounting curricula. A list of the 72 topics, by category, is presented in Table 1. Schools of business were surveyed to determine the level of content at which each of these topics was being presented in their undergraduate accounting programs.

The purpose of our research was to provide empirical data concerning CPA practitioners' views of the desired levels of content for the 72 topics. These findings can be compared with the actual levels of content found in the AAA study. Areas of difference should be of interest to both educators and practitioners.

RESEARCH DESIGN

The 100 largest CPA firms, by AICPA membership as a of January 31, 1976, were used as the survey group in this study. Most of the firms are included in the AICPA annual *Supply of Accounting Graduates and the Demand for Public Accounting Recruits* [1977] survey which would qualify them as firms actively recruiting undergraduate accounting majors. It was believed that those firms which actively recruit undergraduate accounting majors would be most interested in the type of education new hirees had been exposed to in their degree programs. The survey was directed to the managing partner of each firm. Each managing partner was asked to give the survey to the person in the firm most interested in the type of preparation new undergraduate hirees had received.

The survey consisted of the list of 72 topics, shown in Table 1, which the AAA committee believed likely to be in accounting curricula. Completion of the survey required placing a number next to each topic to signify the respondent's opinion as to the content level that a new hiree should have been exposed to in an undergraduate accounting program. The four content levels were [Bloom, 1956]:

Level 1	Introductory level knowledge, implying an awareness and general understanding of principal topics.
Level 2	Application of knowledge and demonstration of analytical capability in the solution of specific problem situations.
Level 3	An extension of Level 2 capabilities to include interpretation, evaluation and synthesis of complex problem situations. Level 3 implies an in-depth understanding of the topic and an ability to communicate conclusions.
Level 0	Exposure to the topic not desired.

The content levels in this survey were the same levels used in the earlier AAA survey except for Level 0. The AAA survey description of Level 0 was: "the topic either is not covered in a program or it is not offered in a course taken by at least one-third of all accounting students in the program" [p. 10]. We consider our Level 0 description to be essentially simi-

TABLE 1

COMPARISON OF RESPONSES FOR CONTENT LEVELS IN UNDERGRADUATE ACCOUNTING PROGRAMS

Content Levels (in Percent)
A = Academic Responses (Level Taught)
B = CPA Firm Responses (Level Desired)

List of Topics	0		1		2		3	
	A	B	A	B	A	B	A	B
External Financial Reporting								
1. Conventional Valuation Bases for Current Assets	0.0	0.0	6.9	10.4	36.0	50.0	57.1	39.6
2. Conventional Valuation Bases for Property, Plant & Equipment	0.0	0.0	6.4	6.3	35.0	56.2	58.6	37.5
3. Conventional Valuation Bases for Other Assets	0.0	0.0	7.9	8.3	42.8	64.6	49.3	27.1
4. Conventional Valuation Bases for Liabilities	0.0	0.0	5.4	8.3	41.9	52.1	52.7	39.6
5. Conventional Valuation Bases for Owners' Equity	0.0	0.0	6.4	12.5	38.4	52.1	55.2	35.4
*6. Preparation & Presentation of Principal Statements, inc. Footnotes	0.0	0.0	7.9	27.1	48.8	45.8	43.3	27.1
7. Disclosure Standards and Procedures	2.4	0.0	15.3	31.2	48.8	39.6	33.5	39.2
*8. Ratio Analysis and Statement Interpretation	0.0	4.2	14.3	43.7	54.2	41.7	31.5	10.4
9. International Reporting Practices	62.5	62.5	29.1	31.2	7.4	6.3	1.0	0.0
Accounting Theory								
*10. Price Level Accounting	3.4	10.4	31.5	66.6	49.3	20.9	15.8	2.1
11. Current Value Accounting	10.8	4.2	41.4	64.5	36.5	27.1	11.3	4.2
12. Other Valuation Bases	77.8	77.1	12.3	16.7	6.4	0.0	3.5	6.2
13. Foreign Currency Translations	31.0	31.2	38.0	50.0	25.6	14.6	5.4	4.2
14. Leases and Long-Term Contracts	0.5	0.0	14.3	22.9	60.6	68.8	24.6	8.3
15. Pension Costs	4.4	2.1	26.1	39.5	53.7	54.2	15.8	4.2
16. Differences between GAAP and Tax Regulations	6.9	2.1	26.1	35.4	46.8	54.2	20.2	8.3
*17. Consolidations, Mergers, and Acquisitions	1.9	4.2	7.9	41.6	40.9	47.9	49.3	6.3
*18. Corporate Dissolutions and Reorganizations	11.8	16.7	36.0	54.1	35.0	27.1	17.2	2.1
19. Evolution of Accounting Thought	27.1	10.4	45.8	66.6	19.2	20.9	7.9	2.1
*20. Measurement of Corporate Social Performance	57.1	33.3	36.5	62.5	4.9	2.1	1.5	2.1
Accounting Pronouncements of Major Regulatory Bodies								
21. Financial Accounting Standards Board and Its Predecessors	3.5	2.1	19.7	16.7	37.9	56.2	38.9	25.0
22. Cost Accounting Standards Board	29.1	8.3	50.7	72.9	16.3	18.8	3.9	0.0
23. Securities and Exchange Commission	18.7	12.5	52.2	62.5	24.7	22.9	4.4	2.1
24. Industry Regulatory Commissions (ICC, FPC, FCC, etc.)	57.6	37.5	36.5	62.5	3.9	0.0	2.0	0.0
Auditing								
25. Generally Accepted Auditing Standards (AICPA)	2.9	0.0	2.5	10.4	34.0	27.1	60.6	62.5
26. Opinions	4.9	0.0	3.9	6.3	43.4	50.0	47.8	43.7
27. Special Reports	12.3	0.0	33.0	43.8	39.4	47.9	15.3	8.3
28. Evidence	3.9	0.0	13.3	16.7	41.9	47.9	40.9	35.4
29. Programs and Procedures	3.9	0.0	15.3	20.9	48.3	60.4	32.5	18.7
30. Internal Control	2.5	0.0	6.4	16.7	39.4	45.8	51.7	37.5
31. Auditing Computer Systems	10.3	2.1	49.8	45.8	30.0	43.8	9.9	8.3
32. Management and Performance Auditing	24.6	12.5	48.3	66.6	20.7	18.8	6.4	2.1
33. Concepts and Objectives of Internal Audits	14.8	2.1	47.8	68.7	25.6	25.0	11.8	4.2
*34. Concepts and Objectives of External Audits	3.9	0.0	7.4	20.9	39.9	56.2	48.8	22.9
35. Public Accountants' Legal Responsibilities	3.5	0.0	18.7	39.6	45.3	41.6	32.5	18.8
36. Ethical and Professional Responsibilities of Auditors	3.4	0.0	15.3	25.0	39.4	35.4	41.9	39.6
Management Accounting								
*37. Planning: Short Run Budgets	2.0	8.3	15.7	52.1	49.8	35.4	32.5	4.2
*38. Planning: Long Run Forecasts	5.9	8.3	26.6	56.3	47.3	31.2	20.2	4.2
*39. Cost Accumulation Systems: Job Order & Process, Absorption & Direct	1.5	2.1	3.4	43.8	39.4	43.8	55.7	10.3
*40. Cost Control: Flexible Budgets and Standard Costs	2.0	2.1	4.4	54.2	40.4	35.4	53.2	8.3
*41. Divisional Performance and Transfer Pricing	13.8	12.5	30.1	62.5	44.3	20.8	11.8	4.2
42. Analysis of Multinational Operations	64.0	47.9	28.1	47.9	5.9	4.2	2.0	0.0
*43. Cost, Volume, Profit Relationships	3.0	4.2	5.4	37.5	43.3	52.1	48.3	6.3
*44. Tax Implications of Alternative Decisions	6.9	4.2	27.1	62.5	47.3	27.0	18.7	6.3
*45. Capital Budgeting	5.4	10.4	9.4	58.3	48.3	29.2	36.9	2.1
46. Analysis for Merger and Acquisition Decisions	28.6	20.9	40.9	56.2	23.1	22.9	7.4	0.0
47. Behavioral Science Applications in Accounting	37.4	22.9	43.8	62.5	16.8	12.5	2.0	2.1
48. Social & Environmental Implications of Alternative Decisions	45.3	35.4	45.3	56.3	7.4	8.3	2.0	0
49. Ethical & Professional Responsibilities of Mgt. Accountants	39.4	18.8	41.9	43.7	14.8	31.2	3.9	6.3
Information Systems								
50. Systems Analysis and Design	23.2	8.3	38.9	50.0	30.0	35.4	7.9	6.3
51. Computer Systems	12.3	6.3	41.4	52.0	37.9	35.4	8.4	6.3
*52. Other Information Systems	45.3	14.6	36.4	62.5	15.3	18.8	3.0	4.1

TABLE 1 (*Continued*)

List of Topics	*Content Levels (in Percent)* *A = Academic Responses (Level Taught)* *B = CPA Firm Responses (Level Desired)*							
	0		*1*		*2*		*3*	
	A	*B*	*A*	*B*	*A*	*B*	*A*	*B*
Federal Taxation								
*53. Individual	0.5	0.0	5.4	22.9	43.8	56.2	50.3	20.9
54. Corporate	4.4	0.0	13.8	20.9	49.3	60.3	32.5	18.8
55. Partnership	8.3	2.1	23.2	35.4	46.3	52.1	22.2	10.4
56. Estate, Trust, and Gift	22.7	6.3	38.4	68.7	24.6	20.8	14.3	4.2
Not-For-Profit Entities								
*57. Fund Accounting	26.1	2.1	22.2	45.8	35.9	47.9	15.8	4.2
*58. Budgeting for Operations & Control: PPBS, Cost/Benefit Analysis	44.3	12.5	31.1	70.8	18.2	14.6	6.4	2.1
Business Law								
*59. Contracts, Agency, Corp., Uniform Comm. Code, Uniform Partnership Act	0.5	0.0	8.4	39.6	45.3	47.9	45.8	12.5
*60. Administrative Law, including Government Regulation	17.2	10.4	30.5	64.6	39.4	20.8	12.8	4.2
Business Applications of Quantitative Methods								
*61. Applied Mathematics, including Calculus	10.8	10.4	27.1	62.5	42.9	22.9	19.2	4.2
*62. Probability	3.0	6.3	18.2	47.9	54.2	39.6	24.6	6.2
*63. Regression Analysis	6.4	18.8	26.6	56.2	49.8	22.9	17.2	2.1
64. Statistical Sampling	3.5	4.2	19.7	25.0	53.2	52.1	23.6	18.7
*65. Decision Models and Operations Research	15.7	20.8	36.5	66.7	36.0	10.4	11.8	2.1
Economics and Business Finance								
*66. Economics of the Firm	2.5	8.3	23.6	56.3	46.3	27.1	27.6	8.3
*67. Effects of Monetary and Fiscal Policy	4.9	8.3	22.2	64.6	49.3	20.8	23.6	6.3
68. Effects of International Economic Events	20.7	20.9	44.3	60.3	27.1	16.7	7.9	2.1
*69. Working Capital Management	6.4	2.1	20.7	52.1	53.2	37.5	19.7	8.3
*70. Long-Term Financing, Capital Structure, & Cost of Capital	3.5	2.1	16.7	41.7	49.3	45.8	30.5	10.4
Organization Theory and Behavioral Science								
*71. Organization Theory	8.4	6.3	28.6	56.2	43.8	33.3	19.2	4.2
72. Human Behavior and Communication in Business Organizations	8.4	4.2	31.5	37.5	43.8	50.0	16.3	8.3

* Indicates Significant Difference at .05 Level.

lar to the AAA description.

The results of the present survey were compared to the results received by the AAA committee to determine:

(1) If a difference existed between topic levels desired by the CPA firms and topic levels being presented in undergraduate acccounting programs.

(2) The direction of any differences, i.e., do the firms desire that particular topics be taught at higher or lower levels than they are presently being taught?

The comparison for item one above was completed using the Kolmogorov-Smirnov two-sample test rather than the chi-square two-sample test because of the expected small cell size [Siegel, 1956]. The comparison for item two was completed using a visual examination of those topics for which a statistically significant difference was found.

RESULTS

A total of 48 responses was received from the sample of the 100 largest CPA firms. The 48 firms were located in 22 states, with New York state having the most representation. The responding firms had hired approximately 8,000 individuals with undergraduate degrees during each of the last three years and employed approximately 48,000 professional staff accountants. Forty of the firms reported formal training programs for new hirees. Respondents to the survey were predominantly partners with duties in personnel, training, administration, or audit areas, or some combination of two of these areas. Respondents generally had between 10 and 20 years of experience in the profession. These responses were compared to the 203 responses the AAA committee received from schools of business. (The 203 responses represented a response rate of 32.5 percent.)

Table 1 presents a comparison of the results of the survey given to CPA firms and the results of the survey conducted by the AAA among schools of business. (Tables 1, 2, and 3 are at the end of the article.) The figures in Column A represent the responses of the schools of business, and the figures in Column B represent the responses of the CPA firms. The absolute responses have been converted to percentages to facilitate analysis.

Statistical analysis of the two surveys, using the Kolmogorov-Smirnov two-sample test, indicates that there was a statistical difference, which was significant at the .05 level, in 30 of the 72 topics. These 30 topics represent 41.7 percent of the 72 topics. Tables 2 and 3 present those topics in which a statistical difference was found between the content level desired by the CPA firms and the content level presented in schools of business. Table 2 lists those topics (27) in which the content level offered in schools is higher than the content level desired by the CPA firms. Table 3 presents those topics (3) in which the content level offered in schools is lower than the content level desired by the firms.

TABLE 2

STATISTICALLY SIGNIFICANT DIFFERENCES* IN RESPONSES FOR CONTENT LEVELS IN UNDERGRADUATE ACCOUNTING PROGRAMS (HIGHER LEVEL BEING OFFERED THAN DESIRED BY CPA FIRMS)

Topic No.	*Description of Topic*
External Financial Reporting	
6.	Preparation and Presentation of Principal Statements, Inc. Footnotes
8.	Ratio Analysis and Statement Interpretation
Accounting Theory	
10.	Price Level Accounting
17.	Consolidations, Mergers and Acquisitions
18.	Corporate Dissolutions and Reorganizations
20.	Measurement of Corporate Social Performance
Auditing	
34.	Concepts and Objectives of External Audits
Management Accounting	
37.	Planning: Short-Run Budgets
38.	Planning: Long-Run Budgets
39.	Cost Accumulation Systems: Job Order and Process, Absorption and Direct
40.	Cost Control: Flexible Budgets and Standard Costs
41.	Divisional Performance and Transfer Pricing
43.	Cost Volume Profits Relationships
44.	Tax Implications of Alternative Decisions
45.	Capital Budgeting
Federal Taxation	
53.	Individual
Business Law	
59.	Contracts, Agency, Corporations, Uniform Commercial Code, Uniform Partnership Act
60.	Administrative Law, including Government Regulation
Business Applications of Quantitative Methods	
61.	Applied Mathematics including Calculus
62.	Probability
63.	Regression Analysis
65.	Decision Models and Operations Research

TABLE 2 (*Continued*)

Economics and Business Finance	
66.	Economics of the Firm
67.	Effects of Monetary and Fiscal Policy
69.	Working Capital Management
70	Long-Term Financing, Capital Structure, and Cost of Capital
Organization Theory and Behavioral Science	
71.	Organization Theory

* Significant at .05 level.

TABLE 3

STATISTICALLY SIGNIFICANT DIFFERENCES* IN RESPONSES FOR CONTENT LEVELS IN UNDERGRADUATE ACCOUNTING PROGRAMS (HIGHER LEVEL DESIRED BY CPA FIRMS THAN BEING OFFERED)

Topic No.	*Description of Topic*
Information Systems	
52.	Other Information Systems
Not-For-Profit Entities	
57.	Fund Accounting
58.	Budgeting for Operations and Control: PPBS, Cost/Benefit Analysis

* Significant at .05 level.

Figure 1 summarizes the responses by topical category, showing the number of statistically significant different topics compared to total topics in each category and indicates whether the academic content level is greater or less than the content level desired by the CPA firms.

Of the 12 categories only one, Accounting Pronouncements of Major Regulatory Bodies, had responses whose differences were not statistically significant. Two categories, Information Systems and Not-For-Profit Entities, had statistically significant differences where the CPA firms desired that the content level of certain topics be higher than currently offered. The remaining nine categories had statistically significant differences where topics are currently being offered at a content level higher than desired by the CPA firms. A visual inspection of the 42 topics in which a statistically significant difference was not found indicates that the content level offered in schools of business is higher than the level desired by the CPA firms for most topics.

Since this research measures differences in desired and actual content level of various topics based on a pre-determined ranking scale, it seems inappropriate to speculate on why these differences exist. However, an examination of the differences raises certain questions that

FIGURE 1

Summary of Academic and CPA Firm Responses

Topic Category	*Ratio of Topics with Statistically Significant Differences to Total Topics in Area Category*	*Direction of Difference A = Academic Responses B = CPA Firm Responses*
1. External Financial Reporting	2/9	$A>B$
2. Accounting Theory	4/11	$A>B$
3. Accounting Pronouncements	0/4	
4. Auditing	1/12	$A>B$
5. Management Accounting	8/13	$A>B$
6. Information Systems	1/3	$A<B$
7. Federal Taxation	1/4	$A>B$
8. Not-For-Profit Entities	2/2	$A<B$
9. Business Law	2/2	$A>B$
10. Quantitative Methods	4/5	$A>B$
11. Economics and Business Finance	4/5	$A>B$
12. Organization Theory	1/2	$A>B$
	30/72	

accounting educators and CPA practitioners may wish to examine:

(1) Are the educational objectives of CPA firms different from other fields of accounting? For example, category nine—Business Law—is a CPA examination topic but is it relevant to the education of an industrial or governmental accountant?
(2) Why do the CPA practitioners see deficiencies in category six—Information Systems—and category eight—Not-For Profit Entities? Has the academic community failed to respond adequately to changes in the level of exposure that students need in these topics?
(3) Is the academic community more in accord with the Beamer report and *Horizons for a Profession* than the CPA practitioners given an apparent overall academic level higher than the CPA firms desire?
(4) If curricula of schools accredited by the American Assembly of Collegiate Schools of Business were compared to the CPA firms' responses, would the apparent differences be even greater? The AAA study listed 20 topics in which a statistically significant difference was found between the content level offered by accredited and non-accredited schools. In all 20 cases the accredited schools' content level was higher than the non-accredited level [p. 18].
(5) Can the differences be resolved by changing course content levels or CPA practitioner desires or some combination of both?

While apparent differences were found in 30 topics it is possible that more differences may exist since the survey did not allow either the schools of business or CPA firms to identify their own list of topics. With pressure being exerted to make curricula more relevant to the "real" world, it is important that the CPA practitioner and the academic community communicate with one another. Hopefully, this research presents one basis for such communication.

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A Simplified Graphical Display of Production and Sales Volume Effects on Absorption Costing Income

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ABSTRACT: Two graphs are constructed to show (1) the effects of sales level changes on absorption costing income (at any specified production volume) and, (2) the effects of production volume changes on absorption costing income (at any specified sales level). Each construction is based on a graph of direct costing income with the result that a useful picture of the relationship between direct and absorption costing income is obtained.

TRADITIONAL textual treatment of cost-volume-profit analysis provides the analytical framework and graphical description for understanding and visualizing the effects of sales volume on income computed under direct costing. Two excellent journal articles (Amerman, 1954; Solomons, 1968) provide a basis for extending such discussions to consideration of both sales and production volume effects on absorption costing income. Unfortunately, the complexity of graphical displays and analytic formulations seems to discourage all but the best beginning students from acquiring the valuable insights obtainable by struggling to understand and extend or generalize these discussions.

The purpose of this brief note is to describe a simple graphical approach illustrating the effect on absorption costing income of sales and production fluctuations. Two graphs are described. The first shows the relationship between income (vertical axis) and sales level in units (horizontal axis). The second shows the relationship between income (vertical axis) and production volume in units (horizontal axis). These two graphs are based on the following data:

The Beta Company produces a single product. Its cost and revenue expectations are:

Selling Price	=$5 per unit
Variable Manufacturing Cost	=$2 per unit
Fixed Selling and Administrative Costs	=$110,000
Fixed Manufacturing Costs	=$100,000
Normal Capacity (used to define a predetermined fixed overhead rate)	=100,000 units

QUESTIONS TO BE ANSWERED GRAPHICALLY

A. How does direct costing income vary with sales level? More specifically,

  (1) what direct costing income would be expected at a sales level of x_s units, or

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   (2) how many units would have to be sold to produce $\$I$ of income under direct costing?

B. Given a specified production volume, how does absorption costing income vary with sales level? More specifically,
   (1) given production volume at x_p units, what absorption costing income would be expected at a sales level of x_s units, or
   (2) given production volume at x_p units, how many units would have to be sold to earn $\$I$ of absorption costing income?

C. Given a specified sales level, how does absorption costing income vary with production volume? More specifically,
   (1) given sales level at x_s units, what absorption costing income would be expected at a production volume of x_p units, or
   (2) given sales level at x_s units, how many units would have to be produced to earn $\$I$ of absorption costing income?

THE GRAPHICAL ANALYSIS

The graphical solution to question A(1) and A(2) is described in most textbooks. It is presented here because it forms the basis for the graphical construction used to answer questions B(1) and B(2). From the numerical data given for the Beta Company, the relationship between direct costing income and sales level is shown by the solid line (labeled $I_{(\text{d.c.})}$) in Figure 1 below.

To construct a graph of the relationship between absorption costing income and sales level, for a specified production volume, simply locate on the horizontal axis the point where the sales level equals the given production volume. Label that point x_p and construct a vertical line at that point to the line $I_{(\text{d.c.})}$. Through the intersection of the vertical line and $I_{(\text{d.c.})}$ construct a line having a slope equal to the contribution margin minus the fixed overhead rate and label it $I_{(\text{a.c.})}$. This line describes the absorption costing income expected at various sales levels, given production at a volume x_p.

In Figure 1, for an assumed production volume of 90,000 units, the dashed line $I_{(\text{a.c.})}$, having a slope of \$2 per unit, shows that to experience a zero profit (under absorption costing) the firm must sell 60,000 units; to earn \$40,000 of absorption costing income the firm must sell 80,000 units; and, that if sales fall to 40,000 units the firm will experience a \$40,000 loss. These observations from Figure 1 are confirmed in the income statement computations shown in Table 1.

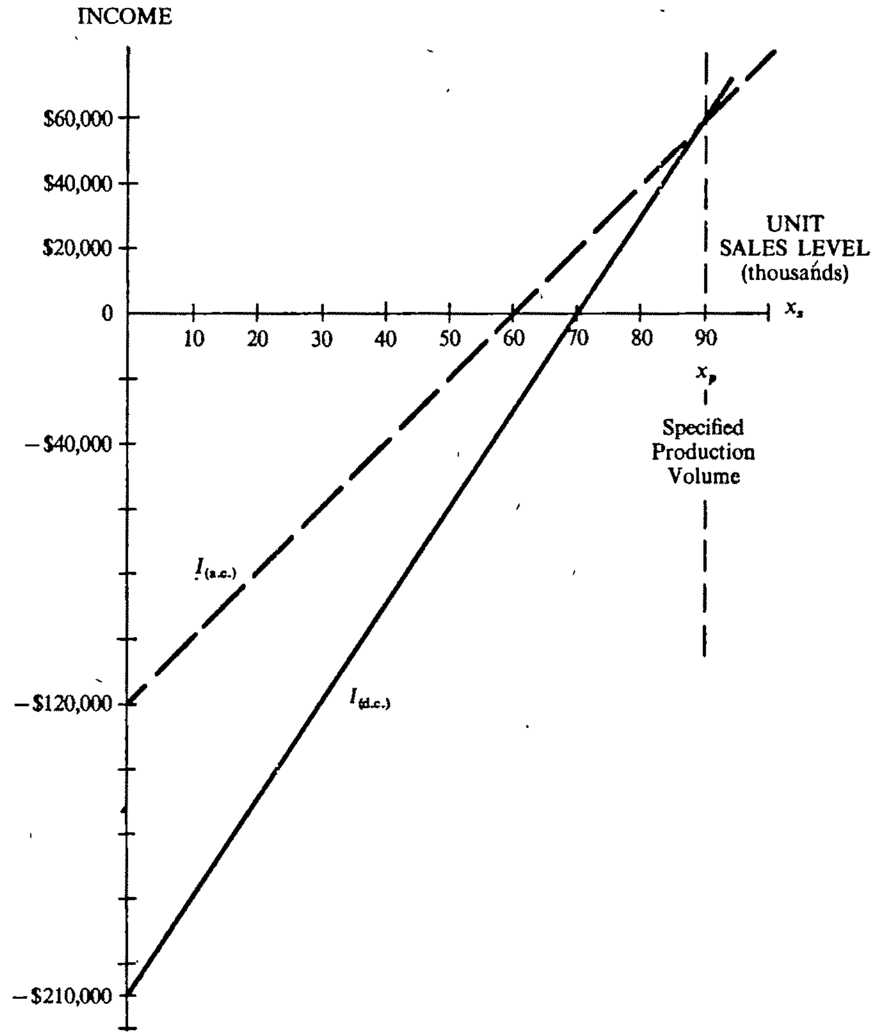
The line $I_{(\text{d.c.})}$ was constructed first as an aid in constructing $I_{(\text{a.c.})}$, but having both lines on the same graph provides a useful picture of the relationship between absorption and direct costing income for the specified production volume as sales varies.

To construct a graph of the relationship between absorption costing income and production volume for a specified level of sales in order to answer questions $C(1)$ and $C(2)$ we start again by drawing $I_{(\text{d.c.})}$ as a reference. In this second construction, however, since direct costing income only depends on the level of sales, $I_{(\text{d.c.})}$ is determined to be a constant from the assumed sales level and is graphed as a horizontal line.

In Figure 2, with an assumed sales level of 50,000 units, $I_{(\text{d.c.})}$ is graphed as a solid horizontal line, showing that at that sales level direct costing income would be $-\$60,000$ regardless of the production volume. Now at 50,000 units, where production volume equals the specified sales level, a vertical line is

FIGURE 1

THE RELATIONSHIP BETWEEN DIRECT/ABSORPTION COSTING INCOME AND SALES LEVEL



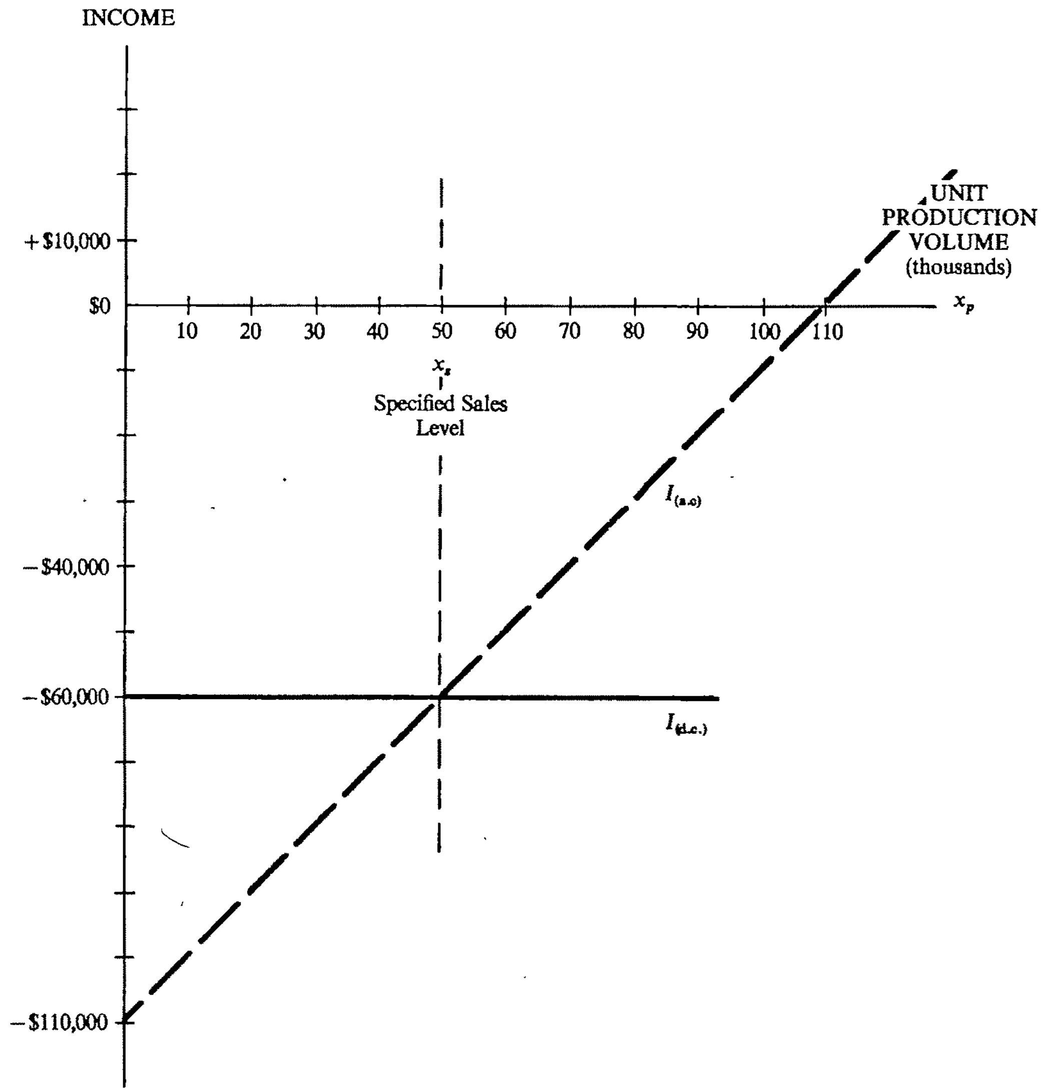
constructed. Through the point where this vertical line intersects $I_{(d.c.)}$ construct a line having a slope equal to the fixed overhead rate and label it $I_{(a.c.)}$. This line describes the relationship between absorption costing income and production volume for the specified level of sales.

In Figure 2 the dashed line $I_{(a.c.)}$ (having a slope of $1 per unit) shows that for an assumed sales level of 50,000 units the firm cannot earn positive profits unless more than 110,000 units are produced, production of 70,000 units results in a loss of $40,000, and of course, at a production volume equal to the specified sales level of 50,000 units, $I_{(a.c.)}=I_{(d.c.)}=-\$60,000$. These observations from Figure 2 are confirmed in the income statement computations shown in Table 2.

Again, while $I_{(d.c.)}$ was constructed

FIGURE 2

THE RELATIONSHIP BETWEEN DIRECT/ABSORPTION COSTING INCOME AND PRODUCTION VOLUME



first as an aid in the construction of $I_{(a.c.)}$, having both lines on the same graph provides a useful picture of the relationship between absorption and direct costing income for the specified sales level as production varies.

AN ADDITIONAL AID IN CONSTRUCTING THE GRAPHS

Letting,

C = contribution margin per unit,
F_m = Fixed Manufacturing cost,
F_s = Fixed Selling cost,
x_s = units sold,
x_p = units produced
x_c = normal capacity in units (the capacity level used to define the fixed overhead rate).

absorption costing income would be de-

TABLE 1

INCOME AT VARIOUS SALES LEVELS

	Production Units (Specified)	90,000	90,000	90,000
	Sales Units	40,000	60,000	80,000
ABSORPTION COSTING	Sales	$200,000	$300,000	$400,000
	Cost of Goods Sold	120,000	180,000	240,000
	Gross Margin	$ 80,000	$120,000	$160,000
	Less: unfavorable Fixed Overhead Volume Variance	10,000	10,000	10,000
	Adjusted Gross Margin	$ 70,000	$110,000	$150,000
	Less: Selling & Administrative Expenses (all fixed)	110,000	110,000	110,000
	Income $I_{(a.c.)}$	($ 40,000)	$ 0	$ 40,000
DIRECT COSTING	Sales	$200,000	$300,000	$400,000
	Variable Cost of Goods Sold	80,000	120,000	160,000
	Contribution Margin	$120,000	$180,000	$240,000
	Less: Fixed Manufacturing Selling and Administrative Expenses	210,000	210,000	210,000
	Income $I_{(d.c.)}$	($ 90,000)	($ 30,000)	$ 30,000

TABLE 2

INCOME AT VARIOUS PRODUCTION VOLUMES

	Production Units	50,000	70,000	110,000
	Sales Units (Specified)	50,000	50,000	50,000
ABSORPTION COSTING	Sales	$250,000	$250,000	$250,000
	Cost of Goods Sold	150,000	150,000	150,000
	Gross Margins	$100,000	$100,000	$100,000
	Less: unfavorable Fixed Overhead Volume Variance	50,000	30,000	(10,000)
	Adjusted Gross Margin	$ 50,000	$ 70,000	$110,000
	Less: Selling & Administrative Expenses (all fixed)	110,000	110,000	110,000
	Income $I_{(a.c.)}$	($ 60,000)	($ 40,000)	$ 0
DIRECT COSTING	Sales	$250,000	$250,000	$250,000
	Variable Cost of Goods Sold	100,000	100,000	100,000
	Contribution Margin	$150,000	$150,000	$150,000
	Less: Fixed Manufacturing Selling and Administrative Expense	210,000	210,000	210,000
	Income $I_{(d.c.)}$	($ 60,000)	($ 60,000)	($ 60,000)

fined by the equation

$$I_{(\text{a.c.})} = -F_m - F_s + \left(C - \frac{F_m}{x_c}\right)x_s + \frac{F_m}{x_c}x_p.$$

If, as for questions $C(1)$ and $C(2)$, the number of units sold (x_s) is held constant, $I_{(\text{a.c.})}$ varies with the production volume at the fixed overhead rate F_m/x_c per unit. It is helpful in constructing a graph of the form shown in Figure 2 to note that the vertical axis is intercepted by $I_{(\text{a.c.})}$ at

$$\left[-F_m - F_s + \left(C - \frac{F_m}{x_c}\right)x_s\right].$$

Draw $I_{(\text{a.c.})}$ through this point so that it intersects $I_{(\text{d.c.})}$ at the specified sales level, x_s.

On the other hand, for questions B(1) and B(2) the number of units produced (x_p) is held constant at some specified volume. On graphs of the form shown in Figure 1 the vertical axis is intercepted by $I_{(\text{a.c.})}$ at

$$\left[-F_m - F_s + \frac{F_m}{x_c}x_p\right]$$

from which $I_{(\text{a.c.})}$ increases at a rate equal to the contribution margin minus the fixed overhead rate

$$\left(C - \frac{F_m}{x_c}\right)$$

per unit sold intersecting $I_{(\text{d.c.})}$ at x_p.

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On the Pedagogy of Financial Accounting

David A. Wilson

ABSTRACT: Dramatic changes have occurred in recent years in the corporate financial reporting environment. The volume and complexity of pronouncements by the various policymaking bodies have noticeably altered the character of and demands made upon financial accounting. Yet, there appears to be a general absence of any widely adopted innovation in the financial accounting curriculum. This paper examines one of the more commonly witnessed curricula for financial accounting and attempts to assess it in the context of its contribution to the intellectual and ethical development of the student. The paper goes on to propose an alternative curriculum, a restructuring of the pedagogy of financial accounting.

ALTHOUGH considerable thought, discussion and resources have been dedicated to the debate over the need for "professional schools of accounting," little attention seems to have been devoted to evaluating critically the pedagogical issues of financial accounting. A preoccupation with consideration of the structure of the organization in which we function may have precluded any significant maturity in our instructional modes. Some heroic efforts to examine accounting education critically have been undertaken in the past decade. Perhaps the most significant among them is the Price Waterhouse Foundation sponsored study [1971].

Additionally the American Accounting Association [Edwards, 1974] produced a volume containing a mélange of papers addressing many of the problems of accounting education. Yet, there still remains a general absence of any widely adopted innovation in the financial accounting curriculum. At many institutions of higher learning, there still exists a reliance upon the textbook as the dominant mode of pedagogy.

The reliance on a two- or three-volume textbook series has honorable roots. Grady [1965] inventoried all generally accepted accounting principles for business enterprises in a single 469-page volume. Yet, in 1978, the quantity and velocity of new accounting pronouncements, changes in existing ones and interpretations may well have rendered our old pedagogy obsolete. Intermediate accounting texts have moved from a four-year revision cycle to three years and the author still must produce annual supplements to the text incorporating the new pronouncements of the previous twelve months.

Currently, the accounting profession, in part prodded by the late Senator Metcalf and Congressman Moss, is reviewing its mandate to the public. It seems that this is perhaps an appropriate hour for

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TABLE 1

A COMMON PEDAGOGY OF FINANCIAL ACCOUNTING

Semester Hours	*Course Title*	*Major Elements of Course Content*	*Primary Source*	*Pedagogical Mode*
3	Principles of Accounting	Elements of bookkeeping, asset valuation, liabilities	Textbook	Lecture/Discussion/Problems & Exercises
6	Intermediate Accounting	Techniques and some of the rationale behind a large number of accounting pronouncements	Textbook	Lecture/Discussion/Problems & Exercises
3	Advanced Accounting	Consolidations, earnings per share, partnerships	Textbook	Lecture/Discussion/Problems & Exercises

accountants in academe to subject their role to a similarly critical scrutiny. It would behoove us to reconsider our financial accounting curricula and pedagogical modes in the light of the new environment within which we exist.

The purpose of this paper is to propose one possible restructuring of the pedagogy of financial accounting—a first iteration in the dialectic process.

A OVERVIEW

Table 1 summarizes a frequently adopted approach to the teaching of financial accounting. The table itself is self-explanatory; however, reliance on the "Lecture-Discussion" pedagogical mode throughout the course sequence is worthy of note. Johnson [1974, p. 161] states, "[T]he prevailing view is that students ought to learn to answer questions raised by somebody else." Yet it can be argued that "the mere act of listening to wise statements and sound advice does little for anyone. In the process of learning, the learner's dynamic cooperation is required" [Gragg, 1940]. A "Lecture-Discussion" mode is ideal for the unilateral transfer of knowledge from one individual (the instructor) to another (the student). Indeed, this transfer is often essential to establish a foundation of ground rules and vocabulary before any further study can be meaningfully commenced. The salient issue surrounds that level which is appropriate for the substitution of an alternative pedagogical mode.

PEDAGOGICAL MODE

Athos [1970] recently articulated the stages of a student's intellectual and ethical development into four levels.[1] Table 2 summarizes the elements of Athos' analysis.

If one maps the frequently adopted pedagogy of financial accounting arrayed in Table 1 against the stages of intellectual and ethical development articulated in Table 2, a discouraging conclusion emerges. Often, the teaching of financial accounting rarely seems to progress beyond Level 1—knowledge is absolute: one question and one answer. Our approach to undergraduate education and the uniform examinations of the AICPA assume that to each question there is a correct answer and that the well-prepared student will have gathered, stored, and developed the necessary retrieval mechanisms to respond appropriately to the examiner's interrogations. Solomans [1977 p. 104] notes in assessing November 1976 CPA examination that of the "four papers taken

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[1] Althos' stages (or levels) of development were drawn from an earlier work by Perry [1968].

TABLE 2

STAGES OF INTELLECTUAL AND ETHICAL DEVELOPMENT

Level	*Assumption About Knowledge*	*Role of Teacher*	*Role of Student*
1	Knowledge is absolute: one question and one answer	Communicate the relevant questions and answers	Memorize and respond with the correct answer
2	Knowledge is identifying the best answer to a problem	Pose the relevant questions and an array of possible answers	Select the best answer from the arrayed possibilities
3	Knowledge is situation specific. Several interpretations are possible depending upon an individual's perspective	Pose problems and assist student in examining the question from alternative perspectives	Experience a problem in its entirety, studying the issue from many perspectives
4	Knowledge is situation specific but I have chosen a set of values and will live by them.	Work to ensure that student is aware that his or her own values, person, purpose and settings are limited in a number of ways	Learn to accept the fact that he or she is relating to others who are different

together, for which a total of 960 minutes were allowed, something less than 10 percent of the candidate's time and effort was to be devoted to material on which he or she might exercise some judgment."

The philosophy which underlies our examination structure is consistent with Level 1 learning and subsumes the ability to compress the relevant knowledge set into a limited number of volumes. In the late 19th Century, "there was a widespread belief that the law was contained in a single book, Blackstone's *Commentaries*, and that self-education by mastery of this book was entirely adequate" [Boatsman, 1978]. We, in accounting, may well be implicitly subscribing to the same school of thought.

The critical consideration is whether today's environment supports the unfaltering dedication to Level 1 education for entrants to the accounting profession. "In the first half of 1977 alone, the Financial Accounting Standards Board, Securities and Exchange Commission, American Institute of Certified Public Accountants, Cost Accounting Standards Board, and International Accounting Standards Committee issued 23 final pronouncements. In addition, by mid-year, 24 new proposals were under active consideration by these bodies" [Boatsman, 1978]. There seems to be scarce evidence to suggest that the proliferation of new pronouncements and interpretations will decline in the near future.

Further, it would appear from the recent pronouncements of the FASB, SEC, and CASB and even the last breath opinions of the APB that we have moved to a stage of "legislative accounting." The tone, flavor, and frequency of recent pronouncements differ noticeably from those of a decade ago. Today's manager possesses considerably less latitude in his reporting of financial position and income than was conceded to his counterpart of the sixties. While the accounting environment has changed dramatically, accounting education has experienced no such broad based and fundamental restructuring.

"In our hurry to purvey or consume it (education), we pause infrequently to question what we are up to. We are alternately too brash and too reactionary and

TABLE 3

AN ALTERNATIVE PEDAGOGY FOR FINANCIAL ACCOUNTING

Semester Hours	*Course Title*	*Major Elements of Course Content*	*Primary Source Documents*	*Pedagogical Mode*
1.5	The Theory of Financial Accounting	Elements of the theory behind accounting and reporting	Readings Text (if available)	Discussion/Lecture
1.5	The Research of Accounting Practice	An introduction to the array of sources for GAAP and the use of them	Case Problems, AICPA/FASB/SEC pronouncements	Lecture/Discussion Preparation of defenses of alternatives accounting
3	Elements of Financial Accounting	The elements of bookkeeping, revenue recognition, asset valuation, liability recognition	Textbook	Lecture/Discussion/ Problems
6	Corporate Financial Reporting	Discussion of resolution of contemporary problems in financial accounting and reporting	Case Problems many references—eg FASB/APB, SEC, CASB, AAA and textbooks	Socratic Inquiry

always, it seems, too busy to decide which and why. More importantly, we are too caught up with pressing numbers and immediate crises to decide what we should be doing in the first place. So we stumble on, giving and receiving schooling without full reflection on the truly sophisticated and ethical practice it involves" [Sizer, 1966].

AN ALTERNATIVE PEDAGOGY

If one can indeed perceive a change in the fundamental structure of financial accounting to a discipline more bounded by statements, rules and interpretations than was evident in years past, then it would behoove the academic community within accounting to escape the "pressing numbers and immediate crises," to reexamine the present pedagogy, and to modify and innovate where appropriate. Specifically, we should critically examine the objectives of financial accounting education and the consistency of our present pedagogical structure with these objectives.

Recognizing and accepting the risk implicit in innovation, this paper proposes an alternative curriculum for financial accounting to the one displayed in Table 1. Obviously, the underlying premise to the proposed restructuring is that, at present, we all too often fail to challenge our students to rise above a Level 1 stage of intellectual and ethical development. Table 3 presents a proposed curriculum for the education of accounting student.[2]

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[2] The curriculum proposed in Table 3 is one designed for accounting majors only. While this paper does not address the question, there appears to be an equally significant need for educators to address the problems which are unique to the non-accounting business major. Further, note that in neither Table 1 nor Table 3 was recognition given to the CPA Review Course, often a part of the senior year or final graduate semester. Its exclusion was deliberate. The offering of such a course is a recognition by a given faculty of a perceived need of its students which can best be satisfied by the department. The sole purpose of the course is to prepare students to

In the proposed alternative pedagogy for financial accounting (Table 3), a half semester (1.5 hours) is devoted to an introduction to the elements of accounting theory. The course would include economic concepts of income measurement and alternative accounting models and would conclude with an introduction to the conventional accounting model: (a) its rationale, (b) its underlying assumptions, and (c) its inherent limitations.

The second half of the semester would serve as an introduction to the alternative sources of authoritative support for accounting principles. The primary purpose of this half-course is to familiarize students with original sources and to introduce the notion of preparing the documentation necessary to support an accounting or reporting alternative. The case problems assigned would be relatively naive and classroom time would be dedicated to the constructive criticism of defenses prepared by the students. The primary objective of this course is to provide students the opportunity to gain familiarity with the publications and documents of those bodies issuing authoritative pronouncements.

The "Elements of Financial Accounting" course would still represent the initial introduction to the mechanics of accounting. It would be expected that, because of the background students would bring to this class, a more comprehensive treatment of the issues presently covered in the traditional introductory accounting courses could be attained. Nonetheless, the primary purpose of the course would be to apply the double entry structure to the consideration of accounting problems.

The final six hours of the proposed course structure, "Corporate Financial Reporting" would address the issues presently covered in conventional intermediate and advanced accounting courses. The significant distinction between the proposed course and our present offerings would be in the pedagogical mode. Instead of using classtime to review problems and to illustrate material covered in the assigned chapter, classes would be devoted to the discussion and resolution of accounting and reporting issues raised in a case context. The notion of "Socratic inquiry" implies that through the dialectic process of thesis, antithesis, and synthesis, students will gain a fuller comprehension of the issues in a problem.

The proposed curriculum is similar to one articulated by Rosen [1977 p. 116]. He predicates his arguments on the assumption that "accountants have to understand all of (1) who is using their information and for what purposes, (2) various accounting techniques, and (3) how to link efficient accounting procedures and users' needs in a variety of situations." These differing educational needs cannot be met through a monophonic pedagogy. Instead, demands must be made of students as early as possible in the educational process to investigate "how to write accounting policy notes and the effects on accounting of different forms of the efficient market hypothesis." [Rosen, 1977 p. 116] He goes on to propose the adoption by accounting educators of partially directed cases drawn from real life.

There are three major, but not insurmountable, impediments to the implementation of the proposed curriculum. First, there is, at present, very little case material available for use in the account-

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take the CPA examinations. The consistency of this objective with those of accounting education in general is currently a matter of considerable debate, and a debate which is quite unrelated to this paper. Accordingly, the subject is ignored in both Tables 1 and 3 and in the subsequent discussion.

ing classroom. A significant allocation of time and resources would be required to develop sufficient case and supporting teaching materials.

Second, Socratic inquiry requires participation and cooperation from students. "Such cooperation from students does not arise automatically, however. It has to be provided for and continually encouraged." [Gragg, 1940]

Finally, the case approach represents a relatively costly pedagogical medium [see Buckley, 1969, p. 395]. The costs are borne not only in the development of materials and shepherding of students but in instructor preparation. If there exists no one correct "answer" to the case, then, in preparation the instructor must attempt to anticipate all avenues down which the class may ramble.

CONCLUSION

The instructional modes in many accounting curricula have changed little in the past decade. Yet as educators, we have an obligation to evaluate continually the propriety of our product. Social responsibility is not a phenomenon restricted to practicing accountants, politicians, lawyers, and corporate boardrooms. In many respects, the social obligations of the academic exceed those of the practitioner or corporate executive. The immeasurability and lack of precision in a definition of "quality" in education saves many of us from the litigation so prevalent in all professional practice today.

The proposed alternative to our present pedagogy for financial accounting represents a "first pass" at the reconsideration and restructuring of our curricula. Many variations and themes are possible and probably preferable to the approach proposed in this paper. The paper, however, represents but one iteration in the Socratic inquiry. Our current curriculum and pedagogical modes represent the thesis; the alternative pedagogy is the antithesis.

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Accounting and Public Service

Gerald Zeisel and Ralph Estes

ABSTRACT: *Pro bono publico* work, or voluntary professional service "for the public good," is a hallmark of both the legal and medical professions. With the movement toward professional schools of accounting and increased emphasis on professionalism in accounting education, explicit consideration should be given to the preparation of accounting students for the assumption of public service responsibilities. In this article, the authors propose means for incorporating attention to public service activities and opportunities into the accounting curriculum, and suggest an outline for a course in public interest accounting.

With the growth of the accounting profession in recent years, many perceive the need for accounting education to help create more of a "professional" attitude on the part of accounting students. [Burton, 1975, pp. 6–7; Larson, 1977, p. 81; Mautz, 1975, p. 33]. This is a major reason for the significant support given to the development of schools of accountancy [Skousen, 1977].

Of the many aspects of behavior that differentiate professionals from others pursuing vocational activities, this paper will concentrate on one—public service. Professional behavior is usually defined to include a "primary orientation to the community interest rather than to individual self-interest" [Barber, 1963, p. 672]. Of course, the community interest is served when accountants perform traditional services (attestation, management and tax advice) for their clients and employers. However, there are other community interests which are not served in this manner. First, there are those organizations and individuals who need accounting services but cannot afford to pay for them. Many believe that "professional" behavior should ensure that these services are made available [Moore, 1970, p. 241]. Another community need which may not be satisfied by traditional means of providing accounting services concerns problems where accounting expertise is needed to deal with aspects of public issues. With respect to "professional" concern for community interest, it has been stated that "since generalized and systematic knowledge provides powerful control over nature and society, it is important to society that such knowledge be used primarily in the community interest. Where such knowledge exists, orientation primarily to community rather than individual interest is an essential attribute of professional behavior" [Barber, 1963, p. 672].

Hence we see that a more "professional" orientation to accounting education should, in part, sensitize students to the concept of community interest. Students should be made aware of the professional obligations and opportunities (a) to provide *pro bono* work, where necessary, and (b) to bring their account-

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ing expertise to bear on public issues. The remainder of this paper will be devoted to suggesting ways of providing this training.

EDUCATION TO DEVELOP A PUBLIC SERVICE ATTITUDE

Education to develop a public service attitude on the part of students could be approached by a special course devoted to this topic and/or by integrating participation in public service activities into the existing courses in the accounting program. An advantage of having a separate course is that sufficient time would be available to consider various issues related to public service (for example, should the accountant be an advocate of one side or attempt to be impartial) and, also, to examine existing literature and to study various methodologies. On the other hand, by having public service activities integrated throughout the accounting program the student observes that public service is not distinct from the rest of accounting but is an integral part of it. Of course, it would be best to have both a separate course and integration throughout the program, but this may not be practical in many situations.

Specific Suggestions

To assist instructors who wish to develop a separate course, a proposal is presented in the appendix to this paper. In addition to a course outline and bibliography, the proposal includes a number of suggested projects for student involvement. Other project examples can be found in the readings suggested in the proposal.

Now let us consider existing courses. The integration of public service activities into these courses not only will help to foster a public service attitude on the part of the student, but it will also provide meaningful practical applications of concepts developed in the classroom. Numerous projects can be conceived to enhance the educational effort in various accounting classes. In addition to those suggested in the course proposal, we now offer other case examples matched with particular accounting subjects.

1. *Auditing or systems.* Develop a manual for municipal governments showing them how to make use of financial audits; evaluate the structure and procedures of state audit agencies; design political campaign receipt and expenditure control systems: conduct an operational audit of activities of a not-for-profit or governmental agency.
2. *Cost or management accounting.* Conduct comparative cost studies, for example, cost of institutional care as opposed to community placement of the mentally retarded; evaluate student center pricing in relation to similar services available in the community; assist small not-for-profit organizations in budgeting and establishing controls.
3. *Financial accounting.* Provide accounting services for minority-owned businesses; study the effect on utility rates of different accounting methods; investigate the broader social and economic implications of various accounting procedures.
4. *Governmental accounting.* Develop manuals and work with various citizen groups that need help to understand governmental accounting reports; evaluate financial disclosure practices of municipalities.
5. *Taxes.* Prepare tax returns for low income taxpayers; evaluate the distributional effects of various tax proposals.

Implementation Assistance

Instructors attempting to incorporate public service activities into accounting programs will be confronted with two major difficulties. First will be the problem of locating interesting cases suitable for student participation. Case identification will become easier as an instructor becomes more familiar with the area and as community organizations become aware of the instructor's activities. However, even with experience, case location still requires a fair amount of time.

A second and far more difficult problem concerns student supervision. Students who have had little practical experience are usually unsure of their abilities and require extensive supervision. This is especially true in public issues cases. The time demands for supervision are so great that instructors working without supervisory assistance generally are able to provide practical experiences to only a few—perhaps four to eight—students at a time.

Both case location and student supervision problems can be overcome by working with professional groups that provide *pro bono* and public issues accounting services. These organizations usually have sufficient case opportunities to offer meaningful experience for students and also have a roster of professional accountant volunteers who could provide most of the necessary supervision. The organizations can be expected to be cooperative because they are getting assistance in handling their engagements and are also helping to develop public service attitudes on the part of students, resulting in increased volunteers in the future when these students become professionals.

Most state CPA societies and NAA chapters have programs to provide accounting assistance to minority businesses and, to a lesser extent, not-for-profit organizations. There are also a few accounting aid societies which provide these services in addition to assisting low-income individuals with their tax returns. Another source for financial and managerial accounting opportunities is the Small Business Administration, which has a program in which certain companies with SBA-guaranteed loans are referred to student teams for management assistance. Since accounting problems generally represent only one of the difficulties these companies have, students with various majors participate as members of these teams. Supervisory assistance for these projects can be obtained by working with volunteer retired executives through the federal government's SCORE program. With respect to tax assistance opportunities, the Internal Revenue Service (through its VITA program) will train students to prepare tax returns for low income and elderly taxpayers. However, the IRS will not supervise students after the training period.

All of the organizations mentioned above have programs oriented solely to traditional accounting services. There is only one national organization of accountants concerned with public issues cases, Accountants for the Public Interest (API). API curently has 11 local affiliates throughout the country, each providing volunteer services for the objective examination and analysis of the accounting or financial aspects of issues affecting the public. The national office is primarily concerned with assisting and strengthening the local affiliates (financial assistance, quality control, *etc.*) and with coordinating projects of national scope. A number of leading accounting practitioners and academics are members of API's national board of directors including former presidents of the AAA and AICPA. Those wishing more information are referred to a recently published book by the executive director of API [Levy, 1977] or should write to:

Accountants for Public Interest
Fort Mason Center Building 310-3rd Floor
San Francisco, CA 94123

SUMMARY

The increased emphasis on a professional orientation in accounting education requires, in part, that students be familiarized with the professional obligations and opportunities to engage in public service activities. We believe that a major part of this training should involve participation in actual cases, with supervision provided primarily by practitioners. Accounting professionals will not only assist instructors by assuming much of the supervisory responsibilities but, more important, these practitioners will provide the students with role models of accountants who are involved in public service activities.

APPENDIX

Course Proposal

I. Type of course: Upper division and/or graduate level.

II. Course title: Accounting and the Public Interest, or Accounting and Public Service, or Seminar in Professional Responsibility

or

Instead of a separate, new course, work in this area might be included in established courses such as Special Studies, Current Issues, Research Seminar, Professional Seminar, *etc.*

III. Rationale for course:

- A. Introduce students to the broad responsibility of the accounting profession to the public interest.
- B. Develop in the student a *professional* sense of responsibility to the broader good of society, beyond that merely of the professional's clients or company and his/her personal interest.
- C. Demonstrate how accounting professionals are fulfilling this responsibility.
- D. Stimulate ideas in students and practitioners for public service.
- E. Provide opportunities for analysis of, and practice in, public interest problems and engagements.
- F. Provide opportunity for professors to fulfill their own professional responsibilities to society and to develop knowledge and expertise in this area.
- G. Provide an opportunity to draw practitioners into cooperative work with students and professors in attacking public problems and issues.
- H. Contribute to the establishment of a tradition in the accounting profession of genuine, meaningful public service.
- I. Provide direct benefits to society through the practicum.

IV. Possible course description:

An introduction to the accounting profession's role in public service, with opportunities to deal with practical social issues and problems.

V. Suggested outline:

- A. The accounting profession's public and social responsibility.

  Assignments:

  Griffin, C. and T. Williams, "In the Public Interest," *The Federal Accountant* (Spring 1965), pp. 68–97.

  Estes, R., "The Accountant's Social Responsibility," *The Journal of Accountancy*, (January 1970), pp. 40–43.

  Statements by professional accounting organizations and by leaders of the profession (such as Ralph Kent in *The Arthur Young Journal*, Autumn 1968, pp. 2–8; Robert Trueblood's address to the annual meeting of the AICPA, reprinted in the *Touche Ross Quarterly*, December 1966, pp. 2–6; and David Linowes, "Social Responsibility of the Professions," *The Journal of Accountancy*, January 1971, pp. 66–69).

Students may be assigned to interview practitioners on how they are serving the public interest, and report to class.

A member of an Accountants for the Public Interest chapter board of directors and/or a member of a public interest law firm may be invited as guest speakers.

B. Survey of research and statistical methods. (Most social performance analysis and evaluation rests on basic research and statistical methods.)

Assignment—selected Chapters in:

Emory, C. W., *Business Research Methods* (Irwin, 1976).

Franklin, J. L. and J. H. Thrasher, *An Introduction to Program Evaluation* (Wiley, 1976).

C. Evaluation of programs and performance.

Assignment—selected material from the following sources:

AICPA, *Environmental Cost/Benefit Studies* (1977). Reports three cases.

AICPA, *The Measurement of Corporate Social Performance* (1976).

Arthur Andersen & Co., *Practice Guidelines for Social Impact Planning and Reporting* (1975). A detailed program for evaluating several forms of social impact.

Estes, R. *Corporate Social Accounting* (Wiley, 1976), Chapters 4, 5, 6.

Guidelines for Project Evaluation (United Nations, 1972). An excellent and practical guide to social benefit/cost analysis using monetary measures. Includes three extensive case studies.

Harvard Business School, *An Annotated Bibliography of Cases Pertaining to Corporate Responsiveness*, June 1975.

Levy, M. *Accounting Goes Public* (University of Pennsylvania Press, 1977). Presents seven case studies, along with information about organizing a local public interest accounting group.

Livingstone, J. L. and S. C. Gunn, *Accounting for Social Goals* (Harper & Row, 1974). Includes a number of cases.

The API Account, bi-monthly newsletter published by Accountants for the Public Interest. Contains reports on cases handled by local affiliates; an excellent source of ideas for public interest work.

Nikolai, L., J. Bazley, and

R. L. Brummet, *The Measurement of Corporate Environmental Activity* (NAA, 1976).

Seidler, L. J. and L. L. Seidler, *Social Accounting* (Melville, 1975). Includes a number of cases.

Standards for Audit of Governmental Organizations, Programs, Activities & Functions (Comptroller General of the U.S., 1972).

Articles selected from periodicals such as *Accounting, Organizations and Society; Business and Society Review; Management Accounting;* and *The Public Interest.*

D. Practicum—a major part of the course should be devoted to a practical, "real-world" project by students working individually or in teams, under the supervision of one or more professors *and* one or more practitioners. Variable credit might be awarded depending on the magnitude of the project. Possible projects abound in every community, although it may take some practice to identify them. The following examples, drawn largely from the authors' communities, should be suggestive:

1. Review and evaluate the proposed budget of the city, county, state or school district.
2. Review expenditure controls within a college or university, with special attention to controls on budget overruns.
3. Undertake a benefit/cost analysis of proposed energy alternatives or of proposed nuclear power or coal gasification plants; include as costs the "non-monetary" effects such as pollution, water usage, danger of explosions and radioactivity, *etc.*
4. Perform a benefit/cost analysis of mass transportation alternatives, including new freeways.
5. Evaluate the possibility of combining city and county governments into a "metro" government.
6. Estimate the tax effect of annexation of industry presently outside city limits.
7. Evaluate the impact and revenue potential of alternative tax propositions.
8. Review and recommend improvements in the accounting and auditing controls in any of the various delegate agencies using public funds. (This is a prime area where valuable service can be rendered.)
9. Review controls over research funds expended within a college or university, for proper support, progress reports, and final disposition.
10. Perform a comparative analysis of operating costs of two or more schools, cities, hospitals, *etc.* Determine and evaluate causes of significant differences.
11. Evaluate state or city requirements for financial reporting by political candidates.
12. Perform a benefit/cost analysis of the college or university's athletic program, or particular segments of that program.
13. Evaluate specific zoning proposals in benefit/cost terms; identify the distributional effects, *i.e.*, who gets what.

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Comments

A Test of the Expectancy Theory of Motivation in An Accounting Environment: A Comment

W. Bruce Johnson

Ferris [1977], reporting the results of a field study which "tested" the descriptive validity of expectancy theory predictions about job performance and satisfaction in a public accounting environment, concluded that "... while the expectancy models were generally weak predictors of audit staff performance, they were significant predictors of employee job satisfaction" and that "These results cast considerable doubt upon the ability of the expectancy model to explain productivity variations among staff accountants and among accountants in general; they also question the utility of the theory in a professional setting" (p. 613).

The correlations between overall job satisfaction and predicted performance (which ranged from $r=.20$ to $r=.37$) were interpreted by Ferris as indicating that the four expectancy models were "significant predictors" of job satisfaction for the audit staff accountants. This is in contrast to the "weak" ability of the expectancy models to predict levels of employee performance, as evidenced by the amount of variance explained (R^2) by each model. However, the reported R^2 values (Table 7) correspond to correlation coefficients of $r=.35$ and $r=.48$, which indicates that the expectancy models were in fact superior predictors of audit staff performance and *not* job satisfaction as Ferris concluded.

Ferris also argued that his results were sufficiently dissimilar to those obtained in other work settings so that the ability of the expectancy models to predict job performance levels in an accounting context was questioned. Mitchell [1974], summarizing the results of some 20 cross-sectional field studies, found correlations averaging about $r=.30$ between predicted and criterion measures of job performance. Similarly, Kopelman [1975] found median correlations between expectancy-valence scores and concurrent job performance of $r=.21$ across sixteen distinct populations. Thus, the results obtained in Ferris' audit staff context compare favorably to those obtained in a variety of other work settings. To the extent that these prior research efforts have demonstrated the descriptive validity of expectancy theory in non-

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accounting environments, the results obtained by Ferris would seem to suggest that the theory may be equally valid in an accounting setting.

The Ferris study used a between-subjects research design for testing expectancy theory predictions of work behavior. This design, in which expectancy-valence scores are correlated with concurrent measures of job performance across individuals, has rather convenient statistical properties and has been extensively employed. However, the design is subject to two criticisms. First, the predictions of expectancy theory are about an individual's future performance or effort level; that is, current expectancy-valence scores represent lead indicators of future work behavior. Correlating expectancy-valence scores with concurrent measures of performance provides, at best, a weak test of the theory's predictive ability. Secondly, formulated as a model of *individual* choice behavior, expectancy theory is strictly a within-individual model of the attitude-effort-performance relationship and clearly requires a within-subjects design for testing its predictions. Kopelman [1977] provides a specific illustration of the methodological difficulties inherent in employing a between-subjects paradigm to test expectancy theory predictions.

A partial solution to these problems is to use cross-lag correlational design in which expectancy model predictions (Time 1) are correlated with immediate estimates of performance (Time 1) and with performance and expectancy estimates generated at a later date (Time 2) (see Lawler [1968]; Lawler and Suttle [1973]; and Sheridan, *et al.* [1974]). Support for the theory is provided when the correlation between Time 1 expectancy predictions and Time 2 performance scores exceeds the other concurrent and lagged correlations between expectancy predictions and performance scores.

Ultimately, however, a within-subjects research design will be required in order to properly test the descriptive validity of expectancy theory. Unfortunately, a major obstacle to conducting within-subjects expectancy theory research is that comparisons must be made across behavioral choices (acts, effort levels) for one person, rather than across people for one type of behavior such as "working hard." As Mitchell [1974, p. 1069] observed:

> If one chooses a within-subject analysis, he must be prepared to measure the degree to which different levels of effort lead to different levels of different outcome dimensions. Three levels of effort with five outcomes with five levels each demands 75 subject responses and still only generates three ΣEV's for each subject. The research work becomes cumbersome very quickly.

Even though the kind of data required by this research design will be difficult to collect from professional employees in a field setting, repeated measures of predictor and criterion variables are necessary if theoretically correct and methodologically sound tests of expectancy theory are to be performed.

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A Test of the Expectancy Theory of Motivation in An Accounting Environment: A Response

Kenneth R. Ferris

PROFESSOR Johnson [1979], commenting on the results and methodology of a prior study [Ferris, 1977], questions the validity of the primary conclusion that "expectancy models were generally weak predictors of audit staff performance." The essence of his position appears to be that: (1) contrary to that suggested by the author, the study findings "compare favorably" to those obtained in prior research and thereby demonstrate the descriptive validity of expectancy theory in the accounting environment; and (2) irrespective of the specific study findings, the methodology utilized "provided, at best, a weak test of the theory's predictive ability." While Professor Johnson's commentary raises several interesting points, his position is based upon illogical reasoning, inconsistent arguments, and in one instance, misquotation.

Professor Johnson begins his comment by claiming that "Ferris argued that his results were sufficiently dissimilar to those obtained in other work settings so that the ability of the expectancy models to predict job performance levels in an accounting context was questioned." While misquotation is an interesting way to develop one's position, it is clearly unacceptable in academic journals. A review of the original article will show that a comparison between current and prior findings was not made, nor was it necessary. Given that the four versions of the expectancy model tested accounted for *only* 12 to 23 percent of the productivity variation in the sample studied, it is clearly unnecessary to refer to other research findings to reach the conclusion that expectancy models were poor predictors of performance.

Professor Johnson then appears to suggest that since "the results obtained in Ferris' audit staff context compare favorably to those obtained in a variety of other work settings," it follows that the theory must then be valid in the accounting environment. This line of reasoning is, "at best," illogical and suggests that Professor Johnson has missed the essence of the prior findings that he cites. Since the expectancy models were found to perform poorly in the accounting environment, and since these results "compare favorably" to those obtained in prior research efforts, one can *only* logically conclude that expectancy models are weak predictors of performance in all environmental settings. Contrary to the inference suggested by Professor Johnson, prior expectancy research has consistently indicated that the theory has a *low* descrip-

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tive validity.

Professor Johnson further argues that the methodology utilized, a between-subjects design, "provides, at best, a weak test of the theory's predictive ability." His position appears to be that if a study is methodologically deficient in any way, then its results cannot be held as valid. This argument necessitates two comments. First, if a theory performs poorly under "weak" test conditions, it is not necessarily true that the theory will perform better under more stringent test conditions. Hence, under alternative test conditions, it is unlikely that a materially different conclusion would be reached regarding the predictive ability of expectancy theory. A second point concerns an inconsistency in Professor Johnson's argument. On the one hand, he deplores the use of a between-subjects design, yet on the other hand, he cites as authoritative evidence the results of prior studies which also utilized a between-subjects design. If one accepts Professor Johnson's position on research design, then it logically follows that one must also question the validity of the prior research findings that he cites.

To rectify these flaws, Professor Johnson advocates the use of cross-lag correlation analysis. While this is, indeed, an alternative, Kenny [1975] suggests that it is a "low-powered test" to be used to test spuriousness in results *previously, repeatedly illustrated in cross-sectional findings*. Hence, Kenny marginally recommends the use of cross-lag correlation analysis as a follow-up to cross-sectional research, not as a replacement for it as Professor Johnson proposes. There also exist a number of unresolved problems with this methodology (*e.g.*, the appropriate lag time), which make it "at best" a doubtful alternative.

All in all, Professor Johnson's comment does make one valid contribution, namely to clarify the secondary relationship between the expectancy model and job satisfaction. However, his arguments are clearly insufficient to counter the primary study finding: expectancy theory is a weak predictor of audit staff performance.

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The Effect of the Separation of Ownership from Control on Accounting Policy Decisions: A Comment

Shu S. Liao

THE purpose of this note is to discuss the inconsistency in findings reported by Smith [1976] regarding the effect of the separation of ownership from control on accounting policy decisions. Modern managerial theories of the firm generally have criticized the neoclassical theories of managerial behavior for failing to maintain the distinction between owner-controlled firms and manager-controlled firms and for testing hypotheses with samples drawn uncritically from populations which contain both owner-controlled firms and manager-controlled firms. The main focus of these managerial theories generally has been to determine what effect, if any, the type of control has upon the pattern in which managerial decisions are made. Smith's award-winning study represents a pioneering work of this kind in accounting.

For readers reasonably familiar with this type of investigation and the current literature, the results of the Smith study can be viewed as inconclusive. This note will re-analyze Smith's data and demonstrate that Smith's findings are contradictory.

The major surprise stressed by Smith is that, when smoothing-change periods are compared with no-change periods, smoothing behavior takes place in both groups of firms when it has the most utility to management. When preliminary income is substantially different from the target, manager firms were expected to make smoothing changes. This is consistent with Smith's findings. However, the owner firms were unexpectedly found to behave like manager firms. Unable to draw a consistent conclusion from the three tests he makes, Smith states: "a conclusion that could be drawn . . . is that the manager in a widely held firm [manager firm] is more concerned than the owner firm about the income target" (p. 720). This conclusion apparently is unwarranted. If we examine carefully Table 3 in the Smith study, it will become obvious that the unexpected result reported above not only is a surprise, but also is a contradiction that could nullify the other two test results reported by Smith in Tables 1 and 2. Figure 1 reports the same data contained in Smith's Table 3 but shows the contradiction.

Column II shows the number of firms that made smoothing changes when

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FIGURE 1

POSITIVE AND NEGATIVE AVERAGE SMOOTHING DIFFERENCES IN MANAGER AND OWNER FIRMS

Income Target I	*Firms With a Positive Average Smoothing Difference* II	*Firms With a Negative Average Smoothing Difference* III	*Column III / Column II in %* IV
Manager Firms			
1	33	18	54.5
2	35	18	51.4
3	37	13	35.1
4	35	14	40.0
5	33	18	54.5
Owner Firms			
1	33	13	39.4
2	34	10	29.4
3	29	17	58.5
4	36	10	27.8
5	31	14	45.2

Income Targets:

1. The Zero Growth Model $\bar{Y}_t = Y_{t-1}$
2. The Individual Firm Growth Model $\bar{Y}_t = Y_{t-1} + (Y_{t-1} - Y_{t-2})$
3. The Individual Firm Growth Model $\bar{Y}_t = Y_{t-1} + 0.5(Y_{t-1} - Y_{t-2}) + 0.3(Y_{t-2} - Y_{t-3}) + 0.2(Y_{t-3} - Y_{t-4})$
4. The Industry Growth Models $\bar{Y}_t = Y_{t-1}(1 + \bar{R}_{t-1})$
5. The Industry Growth Models $\bar{Y}_t = Y_{t-1}(1 + 0.5\bar{R}_{t-1} + 0.3\bar{R}_{t-2} + 0.2\bar{R}_{t-3})$

Where:

Y_{t-1} = Reported earnings per share in period $t-1$
$\bar{Y}_t$ = Target earnings per share in period t
$\bar{R}_t$ = The rate of growth in industry earnings per share in period t.

changes should be made according to Smith's smoothing hypothesis. Column III shows the number of firms that did *not* make smoothing changes when changes should be made according to the smoothing hypothesis. Since the numbers in Column II are essentially the same for manager firms and owner firms, we should concentrate on the difference in numbers in Column III. Column IV reflects the relative importance of Column III numbers. Note that the percentages in Column IV are consistently higher for manager firms than for owner firms except Target 3. This implies that when the firm is relatively far away from the target, a relatively larger percentage of manager firms made no smoothing changes when changes should have been made according to Smith's smoothing hypothesis. This is both inconsistent with and contradictory to Smith's other tests. Target 3 has been a weak factor in other tests and probably should be excluded from our examination.

Very little empirical research has been done to study the effect of the separation of ownership from control on accounting policy decisions, and Smith should be credited for providing some empirical evidence in this area. Unfortunately, Smith's findings are far from being conclusive, much as the contradictory empirical evidences found in economics and organizational sciences.[1]

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[1] Empirical studies which show that the separation of ownership from control has an effect on managerial decisions include Monsen, Chiu and Cooley [1968], Boudreaux [1973], Palmer [1972, 1973], and Radice [1971]. But the studies by Larner [1970], Kamerschen [1968], Lewellen and Huntsman [1970], and Holl [1975] found no difference in behavior between owner-controlled and management-controlled firms.

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The Effect of the Separation of Ownership from Control on Accounting Policy Decisions: A Reply

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The comment by Liao suggests that the results of the comparison of smoothing-change periods with no-change periods for owner firms is a contradiction that could nullify the results originally reported by Smith [1976] in Tables 1 and 2. Tables 1 and 2 indicate that the policy decisions made by manager firms smoothed income significantly more often than the policy decisions made by owner firms. The discussion which follows indicates that the results concerning no change periods neither contradict nor nullify the theory of managerial control which hypothesizes that manager firms will smooth income more often than owner firms.

Theories of managerial control argue that managers in manager firms frequently will adjust the income number to minimize outside intervention in the affairs of the corporation by stockholders. The adjustments to smooth income are frequent since the management has no significant stock holding and must therefore maintain its position by presenting the results of operations in a favorable and defensible way.

In those owner-controlled firms, where the owner does not actively manage, the management does not artificially manipulate or smooth income because of the large owner's access to more complete information and the owner's superior financial advice. If the owner actively manages the firm, the owner-manager experiences relatively little pressure to make income look adequate or satisfactory since the owner holds a relatively large block of stock which allows control to be maintained without frequent adjustments to the reported income numbers.

If one defines owner control to exist in corporations when a single party owns ten percent or more of the voting stock [Smith, 1977, p. 712], then it should be expected that occasional (and infrequent) smoothing adjustments to income may be needed to represent the owner defensibly against tender offers, take-over bids and proxy fights, or, perhaps, to facilitate the issuance of long term debt. The need to make a policy decision to relieve outside pressure occurs far less often for the owner firms since the owner firm's stockholders can, with their block of stock and, therefore, strong defensive position, ignore relatively minor fluctuations which compel the manager firm to take some action. Thus one would expect to find fewer smoothing decisions in owner firms than in manager firms; when those decisions do occur, however, they occur when income is

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substantially removed from the target. The theory suggests that the majority of the accounting policy decisions in owner firms will be governed by some non-manipulative purpose such as a concern for taxes or to influence labor's bargaining position.

Smith's results in Tables 1 and 2 confirm the tendency of manager firms to smooth to a much greater extent than owner firms. The motivation for comparing deviations from target in smoothing years and no-change years was to ascertain if manipulative smoothing occurred when the theory suggested—when income was relatively far from target. Smith's Table 3 confirmed that the smoothing decisions in both manager and owner firms take place when preliminary income is substantially removed from the target. The table clearly indicates that manager firms smooth income when they are expected to—when they are further away from the target than in no change years. Owner firms are also further away from the target in smoothing years than in no-change years. In fact, on targets 1, 2, 4 and 5, a slightly higher percentage of the owner firms have positive average smoothing differences. Liao claims in Exhibit 1 that these results are contradictory to the theory of type of control on policy decisions.[1] I would argue that the results merely confirm what has been suggested above—that owner firms make *few* manipulative decisions, but *they only have to make them when they are very far from target.*

If owner firms smooth only occasionally when very bad results force them to act, for the few smoothing decisions made, the positive average smoothing difference will tend to exceed the negative average smoothing differences. It is also possible that the manager firms which smooth more often eventually reduce the set of available smoothing vehicles. They may, therefore, desire to smooth income in some period but be unable to do so because they have previously used their best smoothing alternatives. Firms which manipulate more often (manager firms) are more likely to show a negative average smoothing difference due to lack of a good smoothing vehicle than firms that manipulate less often (owner firms). Thus, the *directional* differences that exist in Liao's Exhibit 1 are consistent with the theory of when a "weak" (possibly 10 percent–20 percent) owner-controlled firm would smooth (not often, but when far away from the target) and could also be partially due to a manager firm exhausting its capacity to smooth.

The issue of how much stock an individual must own before he exerts significant influence on a corporation is a matter of much controversy. The "contradiction" which Liao has pointed out should not exist if an owner had absolute control of his firm in the sense that takeover bids, *etc.*, would not be possible. In such firms, manipulative smoothing as a defensive mechanism would be unnecessary.

It could be argued that when an owner's control of a firm is relatively strong, he might not feel the need to smooth at all during the period of time encompassed by Smith's study. I am suggesting that within the owner-controlled group of firms, the stronger the control, the less likely it is that the firm will be pressured by fluctuating income to engage in smoothing behavior. In

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[1] Liao is concerned about directional differences on targets 1, 2, 4 and 5. If one calculates a χ^2 corrected for continuity in an attempt to reject the null hypothesis that the proportion of positive average smoothing differences is identical for owner and manager firms, values of .276, .985, .277 and .047 are obtained for χ^2 on targets 1, 2, 4 and 5 respectively—none of these allow for rejection of the null at any reasonable level of significance.

Figure 1 below, I have used the format of Liao's Exhibit 1 to present the results for the owner-controlled firms in my sample which have a block of stock in excess of 20 percent. The owners of these firms are certainly not immune to take-over pressures but they are less threatened by such attempts than the owners in the 10 percent–20 percent group of firms.

FIGURE 1

POSITIVE AND NEGATIVE AVERAGE SMOOTHING DIFFERENCES IN MANAGER AND OWNER FIRMS

Income Target *I*	*Firms With a Positive Average Smoothing Difference* *II*	*Firms With a Negative Average Smoothing Difference* *III*	*Column III / Column II in %* *IV*
Manager Firms			
1	33	18	54.5
2	35	18	51.4
3	37	13	35.1
4	35	14	40.0
5	33	18	54.5
Owner Firms With a Single Holding Greater 20%			
1	17	10	58.8
2	17	9	52.9
3	16	11	68.7
4	18	9	50
5	15	12	80

The results clearly reverse the directional results of Column IV which caused Liao to claim contradiction and nullification. The reversal is perhaps more dramatic than stated since, for targets 1, 3, 4 and 5, there were six firms which made no smoothing decisions, while for target 2 there were seven firms which made no smoothing decisions. It might be suggested, then, that Liao's original concern with his Column IV is due to the owner firms in which the owner owns 10–20 percent of the outstanding shares. For these owner firms smoothing reactions take place when deviations from targets are large, and positive average smoothing differences predominate. As owner control becomes more absolute, the increased number of firms with negative average smoothing differences and the number of firms making no smoothing changes at all, indicate the reduced importance of smoothing behavior to these more closely held firms.

My original expectation that in owner firms the number of positive average smoothing differences should equal the number of negative average smoothing differences [Smith, 1976, p. 720] resulted from thinking about owner-controlled firms as being absolutely controlled. Among the contributions of Liao's comment is that it is a clear reminder that owner-controlled firms with a largest shareholding of less than or equal to 50 percent are not to be treated as absolutely controlled. Owner-controlled firms of this type will make some smoothing decisions and these decisions are likely to be made in such a pattern that positive average smoothing differences will predominate. To acknowledge this contribution, however, is not to accept the suggestion that the findings concerning smoothing decisions are either nullified, or, even necessarily, contradicted. Smoothing appears to provide the motivation for a large number of manager firm decisions and for a much smaller set of owner firm decisions.

One final reply concerns Liao's characterization of the empirical evidence outside of accounting as being contradictory and inconclusive. No good purpose is served by claiming that the results of Monsen *et al.* [1968] conflict with Larner [1970] and Kamerschen [1968]. In fact, such statements lead others to miss the methodological strength of Monsen *et al.* Larner and Kamerschen used the same data and dichotomized firms into manager-controlled and owner-controlled groups based on whether a holding of ten percent or greater existed. The obvious weakness in such a procedure is that a firm of 9.9 percent may be considered manager-controlled, while one of 10.1 percent is called owner-controlled. Not surprisingly, neither Larner nor Kamerschen found profitability to vary by type of control.

Monsen *et al.* removed the group of firms between five and ten percent from his sample to obtain two groups of firms which are sufficiently different to examine the effects of type of control on profitability. He found the owner firms to be significantly more profitable than the manager firms. Larner, himself, suggests that his lack of results is due to his failure to remove the marginal firms from both control classifications [Larner, 1970, p. 32]. I agree with Larner that the contradictory results are due to the different control classifications employed. I suggest that the conflicting results of these studies indicate more about the research methodology which was used than they do about the effect of type of control on firm behavior.

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FINANCIAL REPORTING

Lee J. Seidler, Editor

Current Issues in the Measurement and Disclosure of Corporate Income Taxes

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ABSTRACT: The information about corporate income taxes disclosed in annual reports has changed significantly since the issuance of Accounting Series Rlease No. 149 in 1973. Several important issues remain unresolved, however, including the measurement of income tax expense for multiple corporate entities, the application of the indefinite reversal criteria for certain differences between book and taxable income, and the disclosure of current income taxes when the deferral method of accounting for the investment credit is used. Examples from corporate annual reports are used in this article to identify underlying reasons for these reporting concerns, and proposals for improved disclosure are offered.

FIVE years have passed since the issuance of Accounting Series Re-/lease No. 149 [U.S. Securities and Exchange Commission, 1973]. This regulation, which requires disclosure of certain supplementary data about a company's income tax expense, has significantly influenced the types of information reported about a company's income taxes. After several years of reporting experience, this seems an appropriate time to re-examine some of the more important measurement and disclosure issues relating to corporate income taxes.

REQUIRED DISCLOSURES UNDER
ASR No. 149

ASR No. 149 requires disclosure of the following information:

✓1. The components of income tax expense, including taxes currently payable, taxes deferred because of timing differences between book and taxable income, taxes reduced because of net operating loss carryforwards, and the net effect of investment credits. Also shown

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should be the amounts of income taxes payable to the Federal government, foreign governments, and state and local governments.
2. A reconciliation between reported income tax expense and an amount equal to the statutory Federal income tax rate of 48 percent multiplied by income before taxes.
3. If it is expected that the cash outflow for income taxes in any of the succeeding three years will substantially exceed income tax expense for that year, this fact should be disclosed, together with the amount of the excess, year of its occurrence, and the reasons for it.

ASR No. 149 states:

> The objectives of these disclosure requirements are to enable users of financial statements to understand better the basis for the registrant's tax accounting and the degree to which and the reasons why it is able to operate at a different level of tax expense than that which would be incurred at the statutory tax rate. By developing such an understanding, users will be able to distinguish more easily between one time and continuing tax advantages enjoyed by a company and to appraise the significance of changing effective tax rates. In addition, users will be able to gain additional insights into the current and prospective cash drain associated with payment of income taxes [U.S. Securities and Exchange Commission, 1973].

In discussing various measurement and disclosure issues, the following criteria, suggested in ASR No. 149's statement of objectives, are used:

1. Are the disclosures adequate to permit statement users to analyze differences in effective tax rates of various firms at a moment in time and for a particular firm over time? (ASR No. 149 defines the effective tax rate as income tax expense divided by income before taxes.)
2. Are the disclosures adequate to permit statement users to assess the impact of income taxes on past and prospective cash flows?

The appropriate response to each of the issues discussed may be to change either the measurement rules followed or the types of disclosures made. In recent years, the Financial Accounting Standards Board has focused primarily on measurement issues while the Securities and Exchange Commission has been more concerned with disclosure. Some issues appear sufficiently fundamental that consideration should be given to standardizing the measurement rules. Others are more amenable to improved disclosure requirements.

DEFINITION OF INCOME TAX EXPENSE FOR MULTIPLE CORPORATE ENTITIES

Most corporations whose shares are publicly traded operate through numerous subsidiaries and affiliated companies. In measuring income tax expense and effective tax rates, should the income taxes of these subsidiaries and affiliates be combined with those of the parent company?

To gain some perspective on this reporting issue, consider the effective tax rate calculation of Sears, Roebuck & Co. Sears does not consolidate Allstate Insurance Company, but instead accounts for its investment using the equity method. Sears defines its effective tax rate as income taxes from consolidated entities (excluding the income taxes of Allstate) divided by pre-tax income of consolidated entities (excluding the equity in earnings of Allstate). For the year ending January 31, 1978, Sears reported an effective tax rate of 49.5 percent in its annual report [Sears, 1978, p. 26]. If the equity in after-tax earnings of Allstate had been included in the denominator, the effective tax rate would have been 29.8 percent. If the income taxes of Allstate had been included in the

TABLE 1

Definition of Income Tax Expense for Multiple Corporate Entities

	P Co.	*A Co. (90%)*	*B Co. (100%)*
Pre-tax Book Income from Separate Co. Activities	$200	$100	$100
Income Tax Expense	(80)	(30)	(20)
Net Income	$120	$ 70	$ 80

Alternative Definitions of Income Tax Expense

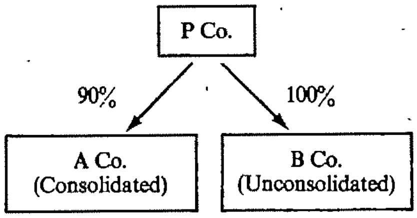
1. P Co.+A Co. [$80+(.9×$30)]	$110
2. P Co.+.9A Co. [$80+(.9×$30)]	$107
3. P Co.+A Co.+B Co. [$80+$30+$20]	$130
4. P Co.+.9A Co.+B Co. [$80+(.9×$30)+$20]	$127

Consolidated Income Statements

	Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Pre-tax Consolidated Income (P Co.+A Co.)	$300	$300	$300	$300
Equity in Income (Post-tax in 1 and 2; Pretax in 3 and 4)	80	80	100	100
Total	$380	$380	$400	$400
Income Tax Expense	(110)	(107)	(130)	(127)
Income Before Minority Interest	$270	$273	$270	$273
Minority Interest in Income (Post-tax in 1 and 3; Pre-tax in 2 and 4)	(7)	(10)	(7)	(10)
Consolidated Net Income	$263	$263	$263	$263

numerator and the pre-tax income of Allstate included in the denominator, the effective rate would have been 35.4 percent. It is clear that the treatment of income taxes of subsidiaries and affiliates can have a significant effect on income tax expense and the effective tax rate.

To provide some insight into this issue, consider the following entity structure.



P Co. owns 90 percent of A Co., whose financial statements are consolidated with P Co. each period. P Co. also owns 100 percent of B Co. Because of the nature of B Co.'s activities, P Co. does not consolidate this subsidiary but accounts for its investment using the equity method. The top portion of Table 1 shows the pre-tax book income, income tax expense, and net income of each of these three companies from their separate activities (that is, before consolidation of A Co. and before applying the equity method for B Co.).

What is the amount of income tax expense to be reported in the income statement and to be used in the expense reconciliation required by ASR No. 149? At least four treatments can be found in published financial statements:

1. Income taxes of the parent plus 100 percent of the income taxes of consolidated subsidiaries. (See Union Carbide Corporation [1977, pp. 27,

32].) As shown at the bottom of Table 1, the income recognized under the equity method is the *after-tax* income of B Co. The minority interest in A Co.'s earnings subtracted in the consolidated income statement is based on the *after-tax* earnings of A Co. (*i.e.*, .10 × $70).

2. Income taxes of the parent plus parent's proportionate interest in the income taxes of consolidated subsidiaries. (See, Union Oil Company of California [1977, pp. 18, 27]). The equity in income of B Co. is again based on after-tax earnings, but the minority interest in the income of A Co. uses *pre-tax* income (*i.e.*, .10 × $100) as the base.
3. Same as Alternative 1 but including the income taxes of unconsolidated subsidiaries. (See Clark Equipment Company [1977, pp. 17, 19].) The income of unconsolidated subsidiaries recognized under the equity method is based on the *pretax* earnings of B Co. The minority interest claim is determined using the after-tax earnings of A Co.
4. Same as Alternative 2, but including income taxes of unconsolidated subsidiaries. (See International Harvester Company [1977, pp. 6, 12].) The equity in earnings and minority interest claim in this case are both based on pretax earnings.

Note that consolidated net income will be the same (*i.e.*, $263) regardless of the reporting format used. The components of net income, particularly income tax expense, are quite different. The effective tax rate reported in the financial statements could range from 28.2 percent to 36.9 percent, depending upon the treatment followed and the definition of "income before taxes."

This reporting problem can be dealt with through improved disclosure. If sufficient information is provided about pre-tax incomes and income taxes for subsidiaries and affiliates, it is possible for statement users to place all firms on a comparable basis, using whichever reporting format is considered most appropriate. The disclosures made by some companies are inadequate for this purpose. For example, Firestone Tire and Rubber Company reports the following information in its income statement for the year ending October 31, 1977 [Firestone Tire and Rubber Company, 1977, p. 29]:

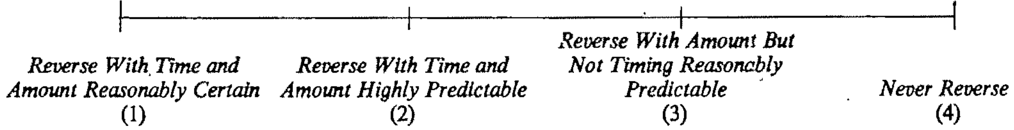
	1977	*1976*
Income before income taxes and minority interests...........	215.8	188.6
Domestic and foreign income taxes......................	[102.9]	[89.9]
Minority interests in income of subsidiary companies........	[2.7]	[2.7]
Net income.................	$110.2	$ 96.0

It is not clear whether the income tax attributable to the minority interest in consolidated subsidiary companies is included in income tax expense or in minority interest in income. (Also see CPC International [1977]; and Dow Chemical Company [1977].)

In addition, separate financial statements which include effective tax rate reconciliations for *unconsolidated* subsidiaries are seldom provided. Sears does provide a separate tax reconciliation for Allstate Insurance Company, an unconsolidated subsidiary. Allstate's effective tax rate for 1977 of 22.8 percent [Sears, 1978, p. 36] differs dramatically from Sears effective tax rate (excluding Allstate) of 49.5 percent [Sears, 1978, p. 26]. With the information provided, it is possible to calculate a fully consolidated tax rate for Sears and Allstate. Many

FIGURE 1

Diagram of Book/Tax Differences and The Degree of Certainty As to Time and Amount That Differences Will Reverse


Reverse With Time and Amount Reasonably Certain
(1)
Reverse With Time and Amount Highly Predictable
(2)
Reverse With Amount But Not Timing Reasonably Predictable
(3)
Never Reverse
(4)

companies with unconsolidated subsidiaries do not provide this type of information (See, for example, Texaco [1977]; and Standard Oil Company of California [1977].)

DEFERRED TAXES AND THE INDEFINITE REVERSAL CRITERIA

Accounting for deferred income taxes has been, and continues to be, controversial. Viewpoints vary as to whether deferred taxes should be provided at all and, if so, on which types of book/tax differences.

Classification of Book/Tax Differences

As a basis for discussion, consider the classification of book/tax differences diagrammed in Figure 1. Four types of differences are shown, using the degree of certainty, both as to timing and amount, that the differences will reverse. In the first group are differences where both the timing and amount of the reversal are reasonably certain. The use of different depreciation methods *for a specific asset* is an example of an item in the first group. Once the acquisition cost, salvage value, depreciable life, and depreciation methods have been selected, the pattern of book/tax differences for depreciation expense will be set. Only the continued use of the asset and passage of time are necessary for the reversals to occur. Other examples of differences in this first group relate to installment sales to specific customers, income recognition for specific long-term contracts and interest, depreciation, and rental expenses on specific long term leases. Accounting Principles Board Opinion No. 11 [Accounting Principles Board, 1967] requires that deferred taxes be provided for items in this first group.

In the second group are items where the timing and amount of the reversal are not known with certainty but are highly predictable. The items in this group differ from those in the first in that the measurement of the revenue or expense giving rise to the book/tax difference is the result of an estimation process. Warranty expense is an example of an item in this second group. For book purposes, a warranty provision is made in the period of sale for the estimated future cost of warranty services. This estimate is based on past experience as well as expectations about future prices and other factors. No effort is made to estimate future warranty cost for a specific customer. For tax purposes, warranty costs are deducted as actual expenditures are made for warranty services. The amount and timing of the reversal are predictable but not certain. Other items in the group include provisions for pensions and for customer allowances (*e.g.*, discounts, returns, uncollectible accounts). APB Opinion No. 11 also requires that deferred taxes be provided for items in this second group.

A third group includes items where the amount of taxes that would be payable upon reversal is reasonably certain but the timing of the reversal is highly uncertain. Income of unconsolidated subsidiaries accounted for using the equity method for book purposes is an item falling in this group. For book purposes, the parent recognizes its share of the subsidiary's income as it is earned. For tax purposes, income is recognized only when a dividend is received. Given the parent's controlling interest, it may be possible to postpone dividend payments indefinitely. APB Opinion No. 23 indicates that equity-method income may give rise to a timing difference, a permanent difference, or a combination of the two. The book/tax differences are viewed as timing differences for which deferred taxes must be provided unless "sufficient evidence shows that the subsidiary has invested or will invest the undistributed earnings indefinitely or that the earnings will be remitted in a tax-free liquidation" [Accounting Principles Board, 1972, para. 12]. In the latter case, the difference is considered a permanent one. Other items that fall in this group relate to income of Domestic International Sales Corporations (DISC), foreign exchange gains and losses, and LIFO inventory valuation allowances. The "indefinite reversal criteria" of APB Opinion No. 23 are applied to each of these items to determine whether deferred taxes must be provided. These items are discussed more fully later in this section.

The fourth group includes book/tax differences that will never reverse, referred to as permanent differences by APB Opinion No. 11. Goodwill amortization, required for book but not permitted for tax, is an example of an item in this group. Deferred tax provisions are not required for permanent differences.

✓ *Deferred Tax Controversy and Adequacy of Disclosure*

The controversy surrounding deferred taxes has concentrated on items in the first group, particularly depreciation expense. The argument might be summarized as follows: For a particular depreciable asset, the timing and amount of the reversal are reasonably certain. If all depreciable assets are considered in the aggregate, however, the timing and amount of the reversal are highly uncertain. This is because, for a stable or growing firm continually replacing or acquiring new depreciable assets, tax depreciation will always equal or exceed book depreciation. The tax deferral therefore represents a permanent postponement. If the firm ever started shrinking in size (*i.e.*, not replacing depreciable assets as they wore out), the differences would reverse. Under these circumstances, however, income taxes would not be payable because operating losses would probably be incurred. Proponents of this view argue that deferred taxes should not be provided whenever the aggregate book/tax difference for a particular item (*e.g.*, depreciation, installment sales) is indefinitely postponed.

The principal theoretical issue in this controversy centers on whether the reversal determination should be based on specific assets and liabilities (*e.g.*, a particular machine, lease, or customer's installment account) or on all similar assets and liabilities in the aggregate (*e.g.*, depreciable assets, leased assets, installment accounts receivable). APB Opinion No. 11 implicitly requires the "individual" approach by insisting that deferred taxes be provided. Opponents argue that an aggregate approach is more meaningful.

Issues of this sort can be argued relative to their internal consistency with some generally accepted theoretical structure. No such theoretical structure currently exists in accounting. A more fruitful approach, particularly in this case, is

TABLE 2

DEFERRED TAX RATE FOR GENERAL MOTORS CORPORATION
(dollar amounts in thousands)

	1973	*1974*	*1975*	*1976*	*1977*
Deferred Tax Expense (Credit)....................	$(173,670)	$259,637	$(74,532)	$ 48,600	$(339,300)
Five Percent of Statutory Tax on Pretax Income................	$ 108,314	$ 40,252	$ 56,911	$131,294	$ 150,521

Source: General Motors Corporation, Annual Reports, December 31, 1973–77.

through disclosure. If adequate information is provided, financial statement users can treat book/tax differences in the first and second groups either as timing or as permanent differences, as they deem appropriate. In addition to information about asset acquisitions and dispositions already provided in the financial statements, a detailed listing of the components of the deferred tax provision is required. With this information, it is possible to assess the likelihood that deferred taxes for particular items will reverse and affect cash flows. In cases where reversal is highly unlikely, the deferred tax provision can be adjusted accordingly.

ASR No. 149 requires the disclosure of individual timing differences included in the deferred tax provision as long as the amounts involved exceed specified materiality thresholds. These thresholds are as follows:

> [1] Types of timing differences that are individually less than 15 percent of the deferred tax amount in the income statement may be combined.
>
> [2] If [a] no individual type of difference is more than five percent of the amount computed by multiplying the income before tax by the applicable statutory Federal tax rate and [b] the aggregate amount of timing differences is less than five percent of such computed amount, disclosure of each of the separate types of timing differences may be omitted. [U.S. Securities and Exchange Commission, 1973, numerical and letter references added].

Ambiguity exists as to the application of the three rules (1, 2a, and 2b). Should the combining of individual types of timing differences in rule 1 be done before or after rules 2a and 2b are applied? Must both rule 2a and rule 2b be satisfied in order to omit detailed disclosures of timing differences or is only one sufficient? Some of this ambiguity can be observed in the financial statements of General Motors Corporation, as summarized in Table 2. Shown there is the total deferred tax expense (or credit) for the years 1973 to 1977. Also shown is an amount equal to five percent of the statutory tax on pretax book income. In four of the five years, the aggregate deferred tax expense exceeds the threshold in rule 2b. General Motors, however, does not disclose amounts for the various items comprising the aggregate deferred tax provision. Apparently, no individual timing difference exceeds 15 percent of the deferred tax provision (rule 1) or, after rule 1 combinations are made, no timing difference exceeds five percent of the statutory tax on pretax income (rule 2a). Other major corporations, such as International Business Machines [International Business Machines, 1977, p. 26] and American Telephone and Telegraph [American Telephone and Telegraph, 1977, p. 31] also do not show the detail of their deferred tax provision. Yet, it is just in situations like that of General Motors when such detailed information would be most useful. The deferred tax provision has varied dramatically from year to year both in amount and direction. Knowing the components of the aggregate provision would assist in identifying the major factors affecting it and helping to predict future reversals.

Indefinite Reversal Criteria

A second problem relating to deferred taxes concerns situations where the amount, but not the timing, of a reversal can be predicted with reasonable accuracy. Such items are in the third group in Figure 1. This category of items was, in a sense, created by APB Opinion No. 23. It specified that deferred taxes need not be provided on the income of unconsolidated subsidiaries and of DISCs if management of the parent has no expectations (intention?) of receiving a dividend from the subsidiary. Management controls if and when a reversal could take place. Such control presumably justifies a different treatment for these items than for other timing differences (*e.g.*, depreciation).

Two criticisms can be directed at the "indefinite reversal criteria" of APB Opinion No. 23. One criticism relates to the notion that because management determines if a reversal will ever take place, a treatment different from those for other deferred taxes is justified. In much the same way, management controls whether the aggregate provision for depreciation differences will ever reverse (through capital investment decisions), whether the aggregate provision for lease differences will ever reverse (through purchase versus lease decisions), and so on. There is little fundamental difference between management's ability to control timing reversals in these situations. To improve consistency in the measurement of deferred taxes, two possibilities might be considered: (1) apply the indefinite reversal criteria to all timing differences, including depreciation, lease expenses, and other items, or (2) eliminate the indefinite reversal criteria and require that deferred taxes be provided on the income of unconsolidated subsidiaries.

A second, but related, criticism concerns current efforts to extend the indefinite reversal criteria to other book/tax differences. As suggested above, this extension may be quite desirable. However, if the concept of "indefinite reversal" is not well specified and guidelines for applying it are not provided, there are likely to be wide variations in the application of the criteria. Such has recently been the case in applying the indefinite reversal criteria to foreign exchange gains and losses. For book purposes, FASB Statement No. 8 requires firms to recognize both realized and unrealized exchange gains and losses. For the most part, only realized exchange gains and losses are recognized for tax purposes. There are differences of opinion as to whether unrealized exchange gains and losses will ever reverse, particularly on monetary assets and liabilities denominated in the home currency of a foreign unit. As a consequence, wide differences in treatment are observable in corporate annual reports.

United Technologies had an unrealized foreign exchange loss for book purposes during 1977. No deferred taxes were provided for the possible future income tax savings that might arise from deducting the loss. Instead, the tax reconciliation showed an additional $2,899,000 of income taxes because the loss was not deductible for tax purposes (thereby increasing the effective tax rate) [United Technologies, 1977, p. 27]. American

Brands also reported an exchange loss for 1977. It, however, provided deferred taxes for the unrealized loss on long-term debt but did not provide deferred taxes on the remaining items giving rise to the loss [American Brands, 1977, p. 33]. The author conducted a survey of large industrial companies which reported tax effects of exchange gains and losses for 1977. Of the 36 companies which reported tax effects. 12 companies provided deferred taxes for unrealized exchange gains and losses, 18 companies did not provide deferred taxes but treated the tax effects of the unrealized gain or loss as a permanent difference, and six companies treated the tax effects of unrealized gains or losses as both timing and permanent differences (details shown in Appendix A).

More than a decade has passed since deferred tax accounting became required by APB Opinion No. 11, and six years have passed since details of the deferred tax provisions have been required by ASR No. 149. Recent evidence on the infrequency of reversals [Davidson, Skelton and Weil, 1977] and the difficulties encountered in extending the indefinite reversal criteria to DISCs and foreign exchange gains and losses suggest that an in-depth reappraisal may be warranted.

Reporting Investment Tax Credits ✓

The method of accounting for the investment tax credit (ITC) can create difficulties in determining the amount of income taxes currently payable for the year. For firms using the flow-through method, the amount reported as a reduction in current income tax expense is equal to the amount realized as a reduction in income taxes payable. Thus, "current" income tax expense is also the amount payable. Such is generally not the case when the deferral method is used. The amount reported as a reduction in income tax expense represents amortization of the ITC realized in the current and prior years. "Current" income tax expense is therefore not necessarily the amount payable. It is necessary that the "deferral" amounts be converted to a "flow-through" basis to determine the amount of income taxes payable. The adjustment required to convert to a "flow-through" basis requires information on both the credit realized and the credit amortized during the year.

Several reporting formats are used by deferral-method firms to report the credit realized and amortized. Four such reporting formats are illustrated in this section. The objective in each case is to determine what, if any, adjustments are necessary to "current" income tax expense to determine tha amount of income taxes currently payable for the year.

AT&T reports the following information [American Telephone & Telegraph Company, 1977, pp. 26, 31]:

OPERATING TAXES

	1977	*1976*
Federal income (A):		
Current	617,042	582,355
Deferred	1,560,628	1,387,782
Investment tax credits—net	820,236	715,944
State and local income:		
Current	178,458	139,726
Deferred	128,738	107,139

Note to Financial Statements:

(3) The effective consolidated federal income tax rate was 38.8 percent in 1977 and 40.6 percent in 1976. This rate is determined by dividing Federal income taxes (including non-operating) by the sum of Federal income taxes, Net Income and ownership interest of others in net income—see note (D). The difference of 9.2 percent and 7.4 percent in 1977 and 1976, respectively, between the effective rate and the 48 percent federal income tax statutory rate are attributable to the following factors:

	1977	*1976*
a. Earnings applicable to investments in companies accounted for on an equity basis which are reflected net of income tax	3.2%	1.7%

b. Certain taxes and payroll-related construction costs capitalized for financial statement purposes, but deducted for income tax purposes, net of related depreciation adjustments for current and prior years	3.0%	3.0%
c. Interest charged construction which is excluded from taxable income, net of related depreciation adjustments for current and prior years	1.0%	1.1%
d. Profits on telephone plant items purchased from Western Electric, which are capitalized for financial statement purposes but not for tax purposes, and which reduce depreciation expense for tax purposes	(.6%)	(.6%)
e. Amortization of investment tax credits over the life of the plant which gave rise to the credits. Such amortization reduced income tax expense for the years 1977 and 1976 by about $224,756,000 and $150,754,000, respectively	3.0%	2.3%
f. Other miscellaneous differences	(.4%)	(.1%)
Total	9.2%	7.4%

AT&T reports the net effect of the ITC for 1977 ($820,236,000) as an *addition* to income tax expense. Its income tax note indicates that ITCs of $224,756,000 were amortized during 1977. Was the credit realized $595,480,000 (=$820,236,000−$224,756,000) or $1044,992,000 (=$820,236,000+$224,756,000)? The addition, rather than subtraction, of the credit to income tax expense tends to be confusing. AT&T's income tax amounts for 1977 might be reconstructed as follows:

Current ($1,045,787,500−$1,044,992,000)	$ 795,500
Deferred	1,560,628
Investment Tax Credit—Net ($1,044,992,000−$224,756,000)	820,236
Total	$3,176,364

The credit realized was $1,044,992,000. This amount has been subtracted from "current" income tax expense and then added to "investment tax credit-net." The effect of the realized credit on income tax expense is therefore washed out. The only item affecting total expense is the credit amortized of $224,756,000. For firms using this reporting format, "current" income tax expense is also the amount payable for the year.

Du Pont uses a second reporting format [du Pont, 1977, p. 34]:

Note to Financial Statements (amounts in 000,000's):

2—Provision for Income Taxes	*1977*	*1976*
Federal		
Current	$346.0	$296.6
Deferred	50.8	34.8
Investment tax credit amortization	(41.4)	(31.7)
Foreign		
Current	27.7	21.1
Deferred	6.7	7.5
State and Local	37.4	29.5
	$427.2	$357.8

The current portions of the Federal and foreign tax provisions are based on taxable income. Current Federal taxes are before deduction of investment tax credit. Investment tax credit generated in 1977 was $70.6 and in 1976, $95.8. For financial accounting purposes, investment tax credit is deferred and the cumulative amount amortized over the expected lives of the related assets.

Du Pont reports amortization of the investment credit for 1977 of $41,400,000. Its income tax note indicates that ITCs of $70,600,000 were generated during 1977. "Current" income tax expense in this case has not been reduced by either the credit realized or the credit amortized. To determine the amount of taxes payable, current federal, foreign, and state and local income expense of $411,100,000 (= $346,000,000 + $27,700,000 + $37,400,000) must be reduced by the credit realized of $70,600,000 to obtain taxes payable of $340,500,000.

Teledyne reports the following information about its income taxes [Teledyne, 1977a, pp. 22, 23]:

Note to Financial Statements:

(9) Income Taxes. The provisions for income taxes for the years ended December 31, 1977 and 1976 were as follows:

	1977	1976
Federal	$133,600,000	$106,500,000
State	20,000,000	13,700,000
Foreign	6,200,000	2,800,000
	$159,800,000	$123,000,000

Such provisions consisted of the following:

	1977	1976
Current	$154,500,000	$116,200,000
Deferred	7,200,000	8,400,000
Investment tax credits	(1,900,000)	(1,600,000)
	$159,800,000	$123,000,000

Teledyne reports the following additional information in its Form 10K report to the Securities and Exchange Commission [Teledyne, 1977b, p. F-16]:

Deferred income taxes of the consolidated companies were related to the following:

	1977	1976
Domestic international sales corporation income	$1,900,000	$5,900,000
Gain on retirement of debt	(100,000)	(800,000)
Deferred investment tax credits	3,700,000	2,200,000
Other, net	1,700,000	1,100,000
	$7,200,000	$8,400,000

Amortization of the investment credit for 1977 is $1,900,000. Teledyne's income tax note indicates that deferred income tax expense includes $3,700,000 for credits deferred during the year. This information might be summarized as follows:

Current ($158,200,000 − $3,700,000)	$154,500,000
Deferred ($3,500,000 + $3,700,000)	7,200,000
Amortization of Investment Tax Credit	(1,900,000)
Total	$159,800,000

As with AT&T, current income tax expense has already been reduced for the ITC realized and thus represents the amount payable for 1977. To wash out the effect of this reduction on income tax expense, the realized credit is added to the deferred tax provisions.

A fourth reporting format is used by Union Carbide [Union Carbide, 1977, p. 32]:

6. Income Taxes

The following is an analysis of income tax expense:

	Millions of Dollars			
	1977		1976	
	Current	Deferred	Current	Deferred
U.S. Federal Income Taxes	$ 60.9	$ 52.7	$119.0	$ 60.0
U.S. Investment Tax Credit	(60.3)	44.9	(54.0)	43.5
U.S. State and Local Taxes Based on Income	7.4	—	13.2	—
Non-U.S. Income Taxes	73.3	(0.1)	48.8	35.9
	$ 81.3	$ 97.5	$127.0	$139.4
Provision for Income Taxes	$178.8		$266.4	

The consolidated effective income tax rate was 30.1 percent in 1977 and 36.7 percent in 1976. An analysis of the difference between the provision for income taxes and the amount computed by applying the statutory federal income tax rate of 48 percent to consolidated income before provision for income taxes is as follows:

	1977		1976	
	Millions of Dollars	Percent of Pretax Income	Millions of Dollars	Percent of Pretax Income
Tax at Statutory Federal Rate	$285.4	48.0	$348.7	48.0
Income Taxes of Subsidiaries Operating in Puerto Rico and Outside the United States	(74.1)	(12.5)	(65.0)	(9.0)
Amortization of U.S. Investment Tax Credit	(15.4)	(2.6)	(10.5)	(1.4)
Allowable Depletion in Excess of Cost Depletion	(13.7)	(2.3)	(9.7)	(1.3)
U.S. State and Local Taxes Based on Income, Net of Federal Income Tax Benefit	3.9	0.7	6.8	0.9
Domestic International Sales Corporation	(5.5)	(0.9)	(4.6)	(0.6)
Other, Net	(1.8)	(0.3)	0.7	0.1
	$178.8	30.1	$266.4	36.7

The amount shown by Union Carbide as "current" income tax expense for 1977 of $81,300,000 is after reduction for the investment credit realized of $60,300,000. The reported amounts might be summarized as follows:

Current (Before ITC)	$141,600,000
Investment Credit	(60,300,000)
Current Income Taxes as Reported	81,300,000
Deferred [($60,300,000 − $15,400,000) + $52,600,000]	97,500,000
Total	$178,800,000

Taxes payable in this case is equal to current income tax expense of $81,300,000. Since the credit realized should not enter into the calculation of income tax expense under the deferral method, the $60,300,000 is added to the deferred tax provision. This addition has the effect of washing out the realized credit. The credit amortized is then shown as a reduction in deferred income tax expense.

As is evident, "current" income tax expense is not necessarily synonymous with income taxes currently payable. The various reporting formats make it difficult for the financial statement user to determine the payable without significant understanding of accounting mechanics. Given the emphasis placed on measuring and predicting cash flows, it is proposed that the SEC explicitly define "current" income tax expense as taxes currently payable on income for the year. This will require, in effect, that the flow-through method be used in calculating *current* income tax expense.

A firm desiring to use the deferral method to calculate *total* income tax expense would then make appropriate conversions through either the deferred tax or deferred investment credit account.

SUMMARY

The significance of the income tax measurement and disclosure issues discussed in this article is easily observable when one attempt to compare effective tax data currently presented by firms in annual reports. Differences in the measurement rules followed and disclosure formats used make intra-firm and inter-firm comparisons difficult. The proposals for change should significantly lessen these difficulties and add to the usefulness of published income tax data.

APPENDIX A

METHOD OF REPORTING TAX EFFECTS OF UNREALIZED FOREIGN EXCHANGE GAIN OR LOSS FOR 1977 BY 36 INDUSTRIAL COMPANIES

Company	*Permanent Difference*	*Timing Difference*	*Permanent and Timing Difference*
Gulf Oil		X	
Phillips Petroleum			X
International Harvester		X	
Rockwell International	X		
R. J. Reynolds		X	
W. R. Grace	X		
International Paper		X	
Litton			X
John Deere		X	
American Brands			X
Textron		X	
United Technologies	X		
Warner Lambert	X		
Uniroyal	X		
Crown Zellerbach		X	
Singer	X		
Bristol Myers	X		
Burroughs		X	
Borg Warner		X	
Kaiser Aluminum		X	
Eaton			X
Merck	X		
St. Regis Paper		X	
Allis Chalmers	X		
Gillette	X		
Avon Products	X		
Control Data	X		
Studebaker-Worthington			X
Carrier	X		
AMF	X		
Crane	X		
Foster Wheeler	X		
G.A.F.		X	
Cummins Engine			X
U.S. Gypsum	X		
Sunbeam	X		
	18	12	6

Source: 1977 Annual Reports of Individual Companies.

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Memorial

LAWRENCE LEE VANCE

1911–1978

The accounting profession lost a great man on June 4, 1978. Lawrence Lee Vance, better known to his friends as Larry, passed away suddenly on that Sunday evening in June. He will be deeply missed by his colleagues, students, and the entire community at the University of California, Berkeley, which has been his academic home since 1941. His contributions to the accounting literature will provide an example of creativity, scholarship, and thoroughness for future generations of accountants.

Larry Vance was born in St. Louis, Missouri, to Archie C. and Myrtle Lee Vance on January 16, 1911. His father was an accountant working first in public accounting and in his later years in corporate accounting. Both sets of grandparents lived on farms, and Larry, in his early years, spent considerable vacation time with them. In high school, he won his letter as a leading member of the debating team, and he was an excellent student as well, being graduated from Webster Groves High School in Webster Groves, Missouri, in June of 1928 at the age of 17. He began his college career at Northwestern University in the Fall of 1928, but after his freshman year he elected to transfer to the University of Minnesota, where he obtained his bachelor's degree in Business in 1932. As a senior he received the Delta Sigma Pi scholarship for achieving the highest scholastic average in his graduating class, and he was also elected to Phi Beta Kappa. He remained at Minnesota, obtaining his Master of Arts degree in Corporate Finance. His master's paper was on the subject of convertible bonds and this paper was published in *Barron's Financial Weekly*.

During his first year at Minnesota, Larry met a young lady, Mary McLaury Gardner, and the relationship blossomed into a romance which continued throughout his college years. With a firm resolve to get married, the young graduate braved the somewhat dismal job market, and he obtained a job as a junior accountant with Peat, Marwick, Mitchell & Co. in June of 1933 at the then very good salary of $1,800 per year. Larry and Mary were married on September 29, 1934. Their son, Lawrence Lee Vance, Jr., was born in 1935 and their daughter, Virginia McLaury Vance, three years later.

During the time that he was in public accounting, Larry began teaching at the Minneapolis YMCA, gaining valuable teaching experience, and it soon became obvious that teaching was his first love. After passing the CPA examination in 1938, Larry accepted a lectureship at the University of Kansas, and, having been offered a similar position at the University of California, Berkeley, two years later, he moved his family to California. He did return to Minnesota for a short period of time immediately after the war to complete work on his Ph D. in Economics, which was granted by the University in 1947.

Larry made significant contributions to the accounting profession. The greatest of these stemmed from the work that he started at the University of Minnesota as a doctoral student in the late 1940s. He was one of the first to apply statistical sampling theory to auditing procedures, and he was the first person to write a large scale treatise on the subject. The work that was begun in Minnesota culminated in a book entitled *Scientific Method for Auditing*, which was published by the University of California Press in 1950. The contribution which this book made to the theory and practice of auditing is best stated by Professor Vance in the preface:

> Almost all auditing work, particularly in the United States, is done on a sampling basis, but no one has bridged the gap between the sister professions of public accounting and statistics to enable auditors to use rigorous statistical reasoning, although the two professions had a parallel development. The present work attempts to serve this need as far as fundamental, readily available statistical concepts are concerned.

The author has accomplished his purpose. Since 1950, the auditing profession has seen an increasingly important role being played by statistics. Since all auditing is primarily based on sampling, there was a great need, as Larry Vance so succinctly pointed out, for a more rigorous approach to sampling. Prior to 1950 all sampling was done on a judgmental basis, the only guides being experience, training, and a qualitative assessment of the system of internal accounting controls of the company being audited. But the nagging question of what is and what is not acceptable had no quantitative guidelines.

As Larry points out in *Scientific Method for Auditing*, a standard is a measuring device. But a major deterrent to the acceptance of standards has been the lack of quantitative "benchmarks." And he further points out that the mathematical reasoning available to the profession in statistical inference removes this stumbling block. Two types of applications were suggested where statistics might be applied. The first is "estimation sampling." The major thrust of this application is to estimate the characteristics of a population from a sample. This approach has been used mainly by accountants as distinct from the auditing profession.

The other use of statistics more directly relates to auditing and is called "acceptance sampling." There are several variants of this technique which have been developed, including sequential sampling, stop-and-go sampling, and discovery sampling. But all of these techniques basically go back to the theory behind the notion of "acceptance sampling." The difference between "estimation sampling" and "acceptance sampling" is quite fundamental. In the use of the estimation technique, the notion of statistical inference is paramount, using inductive methodology. On the other hand, the decision to accept or reject a population requires a predetermined level of precision and reliability which would be acceptable to an auditor. The latter technique, together with its corollaries, stop-and-go, sequential, and discovery sampling, require an "up-front" judgment that in the 1950s was difficult to sell to the profession. The idea that an auditor had even a probability of being wrong was anathema to the profession. And almost worse was the specification of precision which implied that the auditor was not precise but relied on a range of probabilities rather than a point estimate. The instinctive reaction of the profession was to cling to the time-honored approach, judgmental sampling. In other words, the auditor did not want to know how wrong he might be in any given situation.

In a contemporary review of the book (THE ACCOUNTING REVIEW, April 1951), John Neter said:

> His book is important because it introduces to the auditing profession certain techniques developed by another profession, pointing out their possible usefulness, analyzing some of the problems likely to be encountered and, in general, facilitating the process of transfer of knowledge.

And in another review in the same journal, a practitioner, Carl Dechow, Jr., wrote,

> In the opinion of the reviewer, the fact that each auditor may set his own standards in using statistical sampling methods should be emphasized and the author's specific suggestions, which are presented as tentative, should not be allowed to obscure this essential freedom.
> In conclusion it is felt that the use of statistical sampling methods is a practical approach to the testing of accounts and will not only save the auditor time but will improve the quality of his audit.

This rather archaic notion that accountants could not set "benchmarks" gradually has been changing since Larry's pioneering effort in 1950. He never gave up the crusade for statistical sampling in auditing. In 1956, he joined forces with John Neter, at that time an Associate Professor of Statistics at the University of Minnesota, and wrote a second book, *Statistical Sampling for Auditors and Accountants*. Larry recognized the broader aspects of statistics in this book. After a rather brief introduction, Part II is captioned "Statistical Decision Making" and is primarily a discussion of the "Acceptance Sampling" approach, drawing largely on the statistical literature dealing with sampling techniques, together with illustrations from quality control theory. Part III of the book deals with the potential applications of "Estimation Sampling" in accounting and auditing, and Part IV seems to represent a somewhat wistful endeavor to show how an auditing firm might use these techniques. Very little evidence is presented in this last part which indicates that these techniques were actually used in practice. In 1956, Larry was unable to find a sufficient number of applications of statistics in accounting or auditing to use as illustrative cases of his methodology. But this was to change quite rapidly.

In the later part of the 1950s, there was a burgeoning of interest in the application of mathematics and statistics to business problems, and Operations Research came into its own. This development provided a fertile climate for the acceptance of the principles espoused by Larry in *Scientific Method for Auditing* and his later work, *Statistical Sampling for Auditors and Accountants*. Worldwide acceptance of these techniques was reflected in an article entitled "A Review of Developments in Statistical Sampling for Accountants," which appeared in the January 1960 issue of THE ACCOUNTING REVIEW. The tenor of Larry Vance's article indicates that "Estimation Sampling" appears to have received greater acceptance in the accounting field than "Acceptance Sampling." For example, in the portion of the article dealing with the current status of statistical methods in accounting and auditing, he writes:

> First, as to accounting. Here the progress is much greater than in auditing. Prominent companies have taken advantage of the method to reduce clerical and similar time [sic]. The idea that accounting information does not have to be 100 percent accurate, and, in fact, seldom is anyway, has gained widespread recognition."

And in the same section of the article:

> As to auditing, there has been substantial experimentation but very few firm conclusions. The committee on statistical sampling of the American Institute of Certified Public Accountants has been active, and various of its members have conducted experiments in their own practices. Up to the time of this writing it has not been willing to express any recommendations or conclusions, but it should be able to do so soon. Auditors have so far been unwilling for the most part to use regular acceptance sampling in their work because it sets up a yes or no decision that they dislike."

But the next decade was to witness a revolution in auditing techniques, both in the use of statistics and in the use of the computer. These techniques tended to complement each other as, for example, in the pioneering work with Auditape by Haskins & Sells (now Deloitte Haskins & Sells). They incorporated statistical techniques into their computer programs, and, at that time, Larry Vance served as one of their consultants. The incorporation of Section 320B, Appendix B on "Precision and Reliability for Statistical Sampling in Auditing" into the Codification of Auditing Standards and Procedures which was issued by the AICPA in 1973 provided the final proof that statistical sampling had finally arrived for the auditing profession.

Larry Vance had many other areas of interest, as evidenced by his other books and articles. He wrote a book, *Theory and Technique of Cost Accounting*, in 1952, and he also wrote an introductory financial accounting text, *Accounting Principles and Control* in 1952, which was revised with Russell A. Taussig as co-author in 1966. The third edition of this introductory text appeared in 1972. In the auditing area, he co-authored a book entitled *Principles of Auditing* with Wayne S. Boutell in 1975. In addition, Larry was a principal draftsman of *A Statement of Basic Accounting Theory* in 1966, the first lecturer in the annual Distinguished Accounting Lecture series at Stanford University in 1970, and the author of some 25 articles and monographs.

In addition to his diverse research interests, he was a leader in many ways, both at the University of California and in the profession of accounting, having served as Associate Dean of the Graduate School, Chairman of the Accounting Area, Associate Dean of Academic Affairs, and as chairman and member of many University-wide committees. He was the Editor of THE ACCOUNTING REVIEW from 1962 to 1964 and President of the American Accounting Association in 1966–1967. He was named the 1977 Distinguished Professor by the California Society of CPAs, and he received The Berkeley Citation in 1978, the highest honor that the University of California can bestow.

He was generous with his time, installing accounting systems and consulting without compensation for religious organizations and university groups. He was an avid orchid grower and maintained an extensive greenhouse at his lovely home atop the hills in nearby Lafayette, California. He was active at both local and national levels of the American Orchid Society, and was president of the

Society for two years. He was a devoted father, an affectionate grandfather, and a loving husband.

His colleagues remember him as a "do-er," responsible, dependable, steady, competent, and straightforward. We can all be grateful for the legacy that has added so much to the combined store of knowledge of all mankind. In Larry Vance, we have a model that we can all seek to emulate in our journey through life.

Wayne S. Boutell

MANUSCRIPTS ACCEPTED FOR FUTURE PUBLICATION

(Accepted between August 16, 1978 and November 27, 1978)

Main Articles

Silvia A. Madeo, "An Empirical Analysis of Tax Court Decisions in Accumulated Earnings Cases"

Ted D. Englebrecht and Robert W. Jamison, Jr., "An Empirical Inquiry into the Role of the Tax Court in the Valuation of Property for Charitable Contribution Purposes"

William E. McCarthy, "An Entity-Relationship View of Accounting Models"

Hugh D. Grove and Richard S. Savich, "Attitude Research in Accounting: A Model for Reliability and Validity Considerations"

Edward Blocher, "Performance Effects of Different Audit Staff Assignment Strategies"

Jerold L. Zimmerman, "The Costs and Benefits of Cost Allocation"

Notes

Lawrence D. Brown and Michael S. Rozeff, "The Predictive Value of Interim Reports for Improving Forecasts of Future Quarterly Earnings"

Comments

Moustafa F. Abdel-Magid, "General Price-Level-Adjusted Historical Cost Statements and the Ratio-Scale View: A Comment"

K. H. Chan, S. F. Lam, and Roger Tang, "Probabilistic Approaches to Return on Investment and Residual Income: A Comment"

Manuscripts are listed in the chronological order in which they were accepted.

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BOOK REVIEWS

Thomas J. Burns, Editor

EDITOR'S NOTE: Books for review should be sent to Professor Thomas J. Burns, The Ohio State University, 1775 College Road, Columbus, Ohio 43210.

STANLEY CHARLES ABRAHAM, *The Public Accounting Profession* (Lexington, Mass.: D. C. Heath and Company, 1978, pp. XX, 294, $18.00).

This book vividly portrays the largely unsuccessful efforts of the public accounting profession to cope with "our age of discontinuity." It describes a profession whose conceptual bases, traditions, and techniques are in disarray, and whose organizational structure is far too cumbersome and weak to cope with the constantly changing demands being placed on it by an uncertainly defined "public." It does not diminish the importance of the book to suggest that these same statements can be, and regularly are, made about medicine, law, education, the church, and, not the least, business—that social institution to which public accounting is so ambiguously tied.

The book is based on two surveys among knowledgeable and informed persons inside and outside public accounting. The first survey, conducted in 1975, focused on identifying the problems of the profession. A follow-up survey (among a partially different set of respondents) attempted to elicit some notion of the relative importance of the previously identified problems, and some indication of how and when these might be solved—if at all.

The surveys were indeed successful in identifying problems: Part I classifies them in 13 separate chapters and these could not unreasonably have been 26 or 39. Towards the end of the book Abraham identifies (fairly, I think) four major problem areas as, "(1) inadequate GAAP and the lack of both a consensus and an underlying framework for GAAP; (2) deficient technical standards, ethics and work performance; (3) the auditor's lack of independence from his client, and (4) uncertainty within the profession about its role in society . . . ." I would add as a fifth problem—implicit in all of Abraham's discussion of the four—the seemingly insurmountable barrier to resolution of these problems created by the organization of the profession. (Perhaps one should ask if there is a profession or an organization.)

Neither the respondents nor Abraham, in his own commentary, give one much cause for optimism about an early resolution of these problems. The rapid spread of audit committees is seen as a step towards establishing a degree of independence for the auditor, but in most other areas, resolution seems to depend on further studies. For me, the question is what will be studied. In my own business of higher education, I believe that our purposes and our goals are ultimately set—however imperfectly—by the society in which we function. So is it with public accounting. The latter cannot, on its own, decide to whom and for what it should account. That must ultimately be determined by society, but society cannot do that until it first decides what activities and what responsibilities it intends business and other accountable institutions to have. Then, and only then, can public accounting completely escape from its muddle.

While a great deal of the substance of this book is probably not new to anyone who has been more than casually associated with the travails of public accounting in recent years, it is an important summary of and commentary on the current state of the profession. It should be read—especially its second half. The first part, which is primarily a presentation of survey results, is, according to the author, structured with "some cost in readability." For this reader, that is something of an understatement. It is often difficult to know whether one is reading the author's or respondents' words. The "repetitions, vagueness and contradictions" about which the author warns are prevalent, and, ultimately, tedious. Fortunately, in Part II, Abraham sheds the shackles of reporting on survey data and summarizes, analyzes, and comments on the issues in concise, straightforward prose. Part I can perhaps be left to dissertation committees and (along with appendices) to those interested in survey techniques. Part II should be read by any reader of this journal.

DWIGHT R. LADD
Professor
University of New Hampshire

DONALD L. ANDERSON and DONALD L. RAUN, Editors, *Information Analysis in Management Accounting* (New York: John Wiley & Sons, 1978, pp. 1, 706, $16.95 paper text).

This book of readings is different from others in the sense that it mixes articles in each part with problems selected mainly from the CPA and CMA exams. The editors have attempted to enrich student understanding by incorporating computer applications in solving the problems. At the beginning of each part, they review briefly the main concepts of each topic and the contribution of each article. The selected articles vary from introductory to advanced ones concerned with behavioral, quantitative, and computer applications directed at solving managerial accounting topics in planning and control.

This book is suitable for advanced managerial cost accounting courses at the undergraduate level and as a supplement to a cost accounting course at the graduate level. The editors advocate that this text can be used for students who had not necessarily completed courses in statistics, quantitative analysis, and/or computers. If this happens, students will not get the most use out of the book. Students should complete their required quantitative analysis courses before taking the course for which this text will be adopted.

The book is divided into five parts. Each part is a composite of different topics. Accordingly, the instructor may find it more convenient to rearrange the articles to suit his own preference. Some articles will take more class time than others, and the instructor, then, has to balance the required readings as to the demand for time and level of quantitative analysis.

Part I discusses project profit planning, and Part II covers period profit planning. These two parts include articles covering a wide range of topics from contribution margin analysis, make or buy, lease evaluation, and cost volume profit analysis to financial modeling, probabilistic budgeting, and cash budgeting. It also includes two behavioral articles. Part III covers the typical capital budgeting problems, and Part IV discusses forecasting and cost estimation. Multiple regression analysis is discussed with computer print-outs to emphasize interpretation of the data and its use in decision making. The quantitative level in this part is higher than that required in the previous three parts.

Part V covers performance evaluation and control. The articles discuss divisional performance, when to investigate a variance, and behavioral consequences of the control system.

Part VI discusses additional applications of quantitative techniques such as linear programming, inventory control, PERT/cost resource allocation, matrix applications, and differential calculus. This part will require more class time to get students to understand this material fully. Computer print-outs have been introduced as a means of solving LP problems so that the instructor can stress the interpretation of the data and its usefulness for decision making. While the editors combined all of these quantitative techniques in one part, they should be covered as different models to aid in solving different problems in designing planning and control systems. The integration of the readings in this part with the previous planning and control parts, will enhance student appreciation of the usefulness of these topics.

Appendix A covers decision theory, and Appendix B includes selected problems arranged to go with the reading of each part. The availability of problems to support the readings of each part is very useful. Unfortunately, the solution of most of these problems is not included in either the text or in an instructor's manual.

Some instructors may prefer articles with advanced quantitative techniques, while others may prefer the opposite. This book attempts to please both preferences. Whether the mix of readings is the right one for a given course has to be judged by the instructor. However, it has a broad range of articles so that it could very well satisfy each need.

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JOHN ARNOLD and MOHAMED EL-AZMA, *A Study of the Relative Usefulness of Six*

Accounting Measures of Income (The Institute of Chartered Accountants in England and Wales, Research Committee Occasional Paper No. 13, 1978, pp. 96, £2.50; P.O. Box 433, Chartered Accountants' Hall, Moorgate Place, London, EC2P 2BJ U.K.).

The confrontation between the SEC and the FASB over standard setting is now out in the open. The SEC has announced an effort to develop "Reserve Recognition Accounting," a partial form of current value accounting, to replace "traditional methods" of reporting by oil and gas producing companies, possibly by 1981. In the September 14, 1978 *Status Report* of the FASB, Chairman Kirk describes the FASB's probable intent to defend their position in Statement No. 19. This throws a vivid spotlight on efforts to find theoretical and empirical justification for choices of measures of income. The *Study* by Arnold and El-Azma is an important contribution to such efforts.

The authors start by crediting the *Sandilands Report* (1975) of the Inflation Accounting Committee (U.K.) and *ED18, Current Cost Accounting* (1976), of the Accounting Standards Committee (U.K.) for creating a "watershed in the development of accounting practice in the U.K."

These recommendations were "based almost entirely on *a priori* arguments." The authors, and others, felt the need to gather more evidence about the alternatives. The *Study* describes the need, and one method (simulation) of gathering the sort of evidence that is needed, and reports some results of its implementation.

Arnold and El-Azma classify approaches to choice of accounting method as either: efficient capital market approach, or user-oriented approaches. A major feature of the study is the extensive footnote referencing here and elsewhere. The authors discuss reasons for their choice of a user-decision-oriented approach. Their intent was to test the predictive value of alternative accounting methods.

The authors decided to use economic measures of income and value as "ideals" against which accounting measures may be evaluated. Their discussion of the usefulness of economic measures of income and value as benchmarks runs for 18 pages, almost half of which are footnote references to authors who have argued for and against this approach. They conclude that the economic measures would be most likely to help predict the expected value of a company's distributable cash flows, and their relative uncertainty when compared with the flows expected from a market portfolio of investments. They also believe that it would enable shareholders to explain differences between estimated and actual dividend payments, and changes in expectations.

The authors provide 12 pages of detailed formulae and descriptions of the relationships assumed in the model. With it, six accounting income measures were examined: historical cost with two adjustments, current operating, money, business, and real business. These are carefully defined and related in tables. The simulation was an experiment to test five main hypotheses. To aid in comparing the numbers produced by accounting and economic measures of income, the authors used the coefficient of determination and the mean absolute relative error.

The results are presented in detail, and are difficult to summarize, since the authors attempt to rank the results, which vary with the hypotheses. (In general, the hypotheses are rejected.) They state: Within the limitations of the analysis used, accounting income measure based on current cost and with no explicit capital maintenance adjustment generally enjoys the highest degree of association with both money and real income. In most circumstances, the same (above) money measure also provides the closest approximation to money economic income. The closest approximation to real economic income is generally provided by the accounting income measure based on current cost and with a capital maintenance adjustment based on changes in a general price index. In the large majority of the cases, the differences between the performance of alternative accounting methods is statistically significant. None of the accounting methods tested either enjoys a consistently high degree of association with economic income or provides a consistently close approximation to it.

The authors recognize the limitations, self-imposed, due to the lack of any explicit account of the impact of uncertainty and expectations changing through time. They are perhaps unduly hopeful that managements would publish the expectations in a form that would enable owners to identify later changes in expectations. For this reason, their methods might have more immediate possibility of use *within* large enterprises. Executive committees can compel managers to furnish these estimates, which can be used for the analyses that the authors have developed. In our present type of large-scale, international corporations managed at the top from a financial return point of view, the potential is intriguing. See, for example, H. Armour and D. Teece, "Organizational Structure and

Economic Performance: A Test of the Multidivisional Hypothesis," *Bell Journal of Economics*, Spring, 1978, p. 106.

Given the conflict between the SEC and the FASB, it appears safe to predict that, at long last, accounting practitioners are going to listen to accounting researchers as they investigate evidence to support alternative accounting principles and procedures.

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C. CLIFFORD ATTKISSON, WILLIAM A. HARGREAVES, MARDI J. HOROWITZ and JAMES E. SORENSEN, Editors, *Evaluation of Human Service Programs* (New York: Academic Press, Inc., 1978, pp. XV, 492, $24.50).

This book consists of 17 articles dealing with the evaluation of human service programs. Human service programs

> are defined as those public and private programs, profit and non-profit, specifically designed and formally organized to alleviate individual or family problems, or to fulfill human needs in the areas of personal growth and development (p. 27).

Such programs may be national or local and they may be highly specialized or comprehensive. Examples of such programs include social welfare, mental health, drug, day care, and adoption programs.

The articles are organized into the following five sections:

1. Introduction to the Field—124 pages.
2. Integrated Management Information Systems—87 pages.
3. Assessment of Community Service Needs —88 pages.
4. Measurement and Evaluation of Program Effectiveness—162 pages.
5. Retrospect and Prospect—24 pages.

The sections are designed to be read sequentially. Of the 17 articles, nine were written by one or more of the editors. This, no doubt, accounts for the fact that later articles reinforce major themes developed in earlier articles. Still, the sections are self-contained to the point where they could be used separately as supplemental material in a seminar setting.

One of the book's strong features is its blend of theory and methodology with practical example. For instance, in the first section, Article 3 discusses program evaluation in the context of classical organization theory and open systems theory. In Section IV, Article 11 discusses various experimental design issues (*e.g.*, power of tests and sample size, randomization of subjects, use of analysis of covariance) which must be considered in studies designed to assess program outcomes. Although none of the theoretical and methodological issues are discussed in great detail, most graduate students who are familiar with such topics will find this to be a welcome integration of their other course work. Undergraduates will find these topics thought-provoking and should be able to follow all or almost all of the material. Extensive references are provided for those students or instructors who would prefer to cover these topics in more detail.

Although the references are extensive, any future editions of the book should include a discussion of two additional areas: (1) the literature dealing with organizational effectiveness and (2) the literature dealing with the evaluation of individual performance. Examples of such literature are:

Ghorpade, J., ed., *Assessment of Organizational Effectiveness: Issues, Analysis, Readings*, (Goodyear Publishing Co., 1971).
Cummings, L. L. and D. P. Schwab, *Performance in Organizations: Determinants and Appraisal*, (Scott, Foresman and Co., 1973).

The evaluation of human service programs is related to the evaluation of organizational and individual performance and these relationships should be made explicit.

Numerous practical examples are provided throughout the book. The Orange County Department of Mental Health's management information system is used to illustrate concepts developed in Section 2. A detailed example of a survey approach to need assessment is provided in Section 3. The numerous examples should be especially important to the career-oriented students who are likely to study program evaluation. Also, practitioners involved in program evaluation will find that the examples make this a useful reference book.

Unfortunately, the benefit derived by the liberal use of examples is mitigated by the fact that a large percentage of the examples deal with mental health programs at a local level. Any future editions of this book would benefit from more examples taken from other local and national programs.

In general, this book is well-written, well-organized, and comprehensive. It will be a useful text in undergraduate classes or graduate seminars dealing with human service program evaluation. Such courses are typically found in public administration or health services programs. Its usefulness in accounting courses is apt to be more limited. Several of the articles would be valuable supplemental material in nonprofit accounting courses. Traditional accounting texts in this area typically spend too little time on evaluation and control. Also, those accounting professors who teach accounting-based courses in public administration or the health sciences will find the book as a whole personally informative and may find the material on management information systems a worthwhile addition to their courses.

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AUDIT GROUP AT THE UNIVERSITY OF ILLINOIS, *Symposium on Auditing Research II* (Urbana-Champaign: The Board of Trustees of the University of Illinois and Department of Accounting, 1977, pp. 244).

This book contains the papers and discussion comments of the second Symposium on Auditing Research co-sponsored by the University of Illinois and Price Waterhouse & Co. on November 11 and 12, 1976. This is another example of the building interest in a cooperative attempt between academicians and practitioners to solve some complex auditing problems. About one-third of the participants were practitioners who also contributed some of the papers and discussants' comments. The book contains five papers representing research into auditing problems and two papers about the topic of research, plus extensive discussant comments. Since interest in such a series of papers is generally limited to the content of the individual papers, each will be briefly reviewed.

Robert S. Kaplan discusses academic research in general and then considers matters relating to what he refers to as development. This latter variable may use research or may just require subjective decisions; it is the primary area of interest to practitioners. He believes that practitioners are perhaps developing a "man on the moon complex," where, if you expend sufficient money on "auditing research," surely you will ameliorate many of the current auditing problems. Since he does not believe that the scientific method can be applied to many of the extant auditing problems, he doubts that the "man on the moon complex" will work and that the practitioners ultimately may become disappointed with the results. He does suggest several general areas for research, and he concludes with "uplifting" recommendations for closing the gap between the two groups.

Edward J. Lusk proposes a sophisticated statistical approach to new-client evaluation by quantifying some of the variables normally utilized in the somewhat subjective client evaluation process. Lusk's was probably a preliminary paper, and it was the most severely criticized of the conference. Harold H. Hensold, of Arthur Young, noted that the author failed to render the model comprehensible, while both he and Dan M. Guy criticized the omission of recent publications such as the AICPA's quality control program and the fact that Lusk did not include in his model the perceived importance of staff competencies. The reason this latter variable was excluded is because the interviewees apparently did not mention it as being important. Hensold's comments include an extensive and interesting assessment of variables that he (or his firm) perceives as important in evaluating both new and existing clients.

William Steve Albrecht and James C. McKeown discuss statistical analysis reviews, a complex area which has long been underemphasized by both researchers and practitioners. The potential usefulness of this approach makes it difficult to understand why it has been so neglected in light of the increasingly sophisticated statistical analyses that are available. One problem has been the lack of available data. This was partially remedied by Haskins & Sells which made several cases available to the researchers. The paper basically compares the results of stepwise regression with two time series procedures, and was very professionally critiqued by William R. Kinney, Jr. Work in this important area is continuing.

"Material in Auditing (Some of the Issues)" is comprehensively investigated (45 pages) by Donald A. Leslie, of Clarkson, Gordon & Co. This detailed review focuses on the effect of materiality on auditing decisions, and it, along with the FASB's materiality discussion memorandum, makes one wonder how auditors can even perform an audit. Likewise, such reports leave one little reason to question why the profession has experienced some difficulty in resolving the materiality issue from both accounting and auditing points of view. The paper is partly in response to the "group of seven's" letter sent to the FASB which focused on some of the critical audit issues as related to materiality. Leslie's paper, along with the comments of both Robert K. Elliott (one of the group) and William L. Felix, Jr., all provide a wealth of potentially useful research areas, even if one might not concur with all of the statements made.

The behavioral literature was reviewed by Michael Gibbins in his paper entitled "A Behavioral Approach to Auditing Research." This extensive but not encyclopedic review of 72 research studies is segregated into four main sections: (1) the external auditor, (2) the investigative process, (3) internal and managerial auditing, and (4) extensions of the audit function. The paper reflects significant insight into the behavioral aspects of auditing and provides numerous suggestions for further research by both pointing out deficiencies in completed studies and areas where research is entirely lacking.

Neil C. Churchill and William W. Cooper (and three other non-participant coauthors), presented "Developments in 'Comprehensive Auditing' and Suggestions for Research." This paper discusses an audit much broader in objective than a financial audit and uses the GAO's activities as a basic model. The work is preliminary, with many of the suggested avenues for further work not really representing "research," according to Kaplan's dichotomy. The concluding paper by William E. Perry of the Institute of Internal Auditors briefly reviews the changing environment of internal auditing and the recent research and developmental activities of the Institute.

To summarize, anyone interested in auditing research in general, or in the specific topics discussed during the symposium, should definitely obtain a copy of this book. As with most such conferences, some may be disappointed with the lack of breadth of subjects covered. (One paper by Douglas Carmichael on the work of the Commission on Auditors' Responsibilities was omitted because the results were published elsewhere after the conference.) While most of the papers were probably not "true" research, they did provide many insights into researchable problems, and most of the discussants displayed substantial knowledge and presented lively critiques.

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S. BASU, *Inflation Accounting, Capital Market Efficiency and Security Prices* (Hamilton, Ontario: The Society of Management Accountants of Canada, September, 1977, pp. ix, 78, $5.00).

The monograph has two clear objectives. The first is to present a short review of the efficient market hypothesis and the capital asset pricing model, along with a compendium of much of the basic empirical accounting research in this field. The second objective is to provide empirical evidence on the relationship between general price level-adjusted (GPL) historical cost accounting numbers and security prices.

For those who are unfamiliar with the information content and risk association literatures, the monograph represents a superbly written overview. The empirical tests and test results are presented in a way which clearly illustrates the basic underlying methodologies. The clarity of presentation should not be surprising to those who have read any of the author's previous research efforts.

The empirical tests conducted include abnormal performance tests *à la* Ball and Brown (1968) and tests of association between accounting and market measures of risk à la Beaver, Kettler and Scholes (1970), using historical cost as well as GPL data (both before and after purchasing power gains and losses). The abnormal performance tests consider the "magnitude of unexpected earnings" rather than just the standard analysis of signs. However, for the record, credit should be given to Beaver, who first considered the information content of the magnitude of unexpected earnings in an unpublished manuscript written in 1974.

For the most part, the empirical results are negative, in the sense that statistically significant differences in the investigated properties of historical cost and GPL numbers are not found. However, once the author presents evidence which indicates that historical cost and GPL numbers are very highly correlated, a result which is not very surprising, the die is essentially cast, and the other test results become largely redundant. From a research (as opposed to pedagogical) standpoint, it seems that more meaningful tests could have been conducted. In the case of abnormal performance tests, for example, one way to focus directly upon differences between historical cost and GPL numbers would be to separately compare security returns for just those cases in which there is disagreement over the relative magnitude or sign of the unexpected earnings. This rather obvious procedure was used by Beaver and Dukes in their *The Accounting Review* study (April, 1972) to overcome the weakness of the abnormal performance tests induced by precisely the same problem that Basu faces in the present study, *viz.*, high correlations among the competing partitioning variables.

The monograph is not rich in the development of new methodologies; nor is there much in the way of unexpected new empirical results. Yet those who have not been exposed to, or are somewhat uncomfortable with, security price-based accounting research are encouraged to invest a few hours in what should prove to be elucidative reading.

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DENZIL Y. CAUSEY, JR., *Accounting for Decision Making* (Columbus, Ohio: Grid Inc., 1978, pp. XIV, 557, $18.95).

This text is designed for a one-term course in financial and managerial accounting for non-accounting majors. The main purpose is to present a comprehensive coverage of accounting topics and to stress the importance of the accounting function in providing data for decision making. This objective has been achieved.

The book is divided into four major parts. Part 1 has only one chapter. It discusses accounting career opportunities and provides a laugh about the old accountant's image. Another successful feature is the inclusion of cartoons throughout the whole book. The cartoon character with his big and long nose and huge eye glasses does many things which the reviewer found funny.

Part 2 has seven chapters which cover many topics in financial accounting. The chapter which describes the accounting cycle, could have more elaboration and procedure examples. The one on financial analysis is very effective for non-accounting majors. It has several illustrations from the *Moody's Industrial Manual* to show readers the sources of information for financial analysis and later give appropriate warnings to the readers about the limitations of financial analysis.

Two chapters deal with complex financial accounting topics such as leases, business combinations, and consolidated financial statements. With the increasing importance of leases and increasing frequency of business combinations, these topics are welcomed. The present value concept and computation are very well presented, and it is wise to put them in the appendix at the end of the book, because there is more than one chapter which requires knowledge of it.

Both Part 3 and Part 4 contain topics in managerial accounting. Part 3 includes topics related to production, such as cost-volume-profit analysis, pricing decisions, product costing, job order and process costing, standard cost and the flexible budget, evaluating short-run production alternatives, and the EOQ and learning curve models. The cost-volume-profit analysis chapter illustrates the use of calculus to find the maximum profit and the optimal price. There is a problem assignment to allocate service department costs to production departments in the job order system chapter, but there is no discussion of this subject in the chapter. The EOQ models and learning curve models are included in the same chapter, which stresses the importance of controlling the prime cost of production. A demonstration problem for using the EOQ model is needed.

The last part of the text has six chapters and includes such topics as accounting systems and internal control, capital project selection, budgeting, federal income tax, forecasting, and allocating resources. A chapter on accounting systems and internal control is a little weak. The deficiency of this chapter does not lie in the coverage of the important topics. Rather it is in the inadequacy of the elaboration and the absence of relevant and up-to-date materials. The capital selection chapter explains well the reasons that the IRR and NPV methods may not always produce the same choice and why some investments have multiple rates of return. A chapter on federal income tax presents four income tax returns for the same organization if it was formed as a corporation, a partnership, a small business corporation, or an individual proprietorship. The comparison of the tax due for each case is interesting and valuable to the readers. The last two chapters introduce quantitative methods.

In general, the text is well-written, with good organization of chapters, comprehensive coverage of topics, well-simplified and presented complex topics, properly defined technical terms, and a smooth and easy-to-follow writing style. However, more procedural examples should be included to demonstrate the occurrence of the variety of situations and requirements, and more elaboration is needed to explain the theories and methodologies. There are two additional features of this text which need to be pointed out. One is the author's style in solving numerical problems. Instead of using a formula approach, the author uses a format approach. Although easier to understand, the format approach may take more time in solving problems and also may not be easy to manipulate for more complex problems. The second feature of this text is the inclusion of many exercises and problems from past CPA and CMA examinations in the managerial accounting section but not many in the financial accounting section. (The percentages are 53 percent for managerial and 3 percent for financial.) This may indicate the author's emphasis on managerial accounting.

In summary, for schools which offer different accounting courses for accounting majors and non-major undergraduates, this text deserves consideration, because it should provide non-accounting majors with an appreciation of accounting regarding what information is provided by accountants and when and how to use it.

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A. WAYNE CORCORAN, *Costs: Accounting, Analysis, and Control* (Santa Barbara: John Wiley and Sons, Inc., 1978, pp. xiii, 786, \$17.95 paperbound).

Professor Corcoran's text is different from other cost books in both (1) its organization of "popular" cost accounting areas (*e.g.*, direct costing, job order costing, etc.) and (2) its integration of concepts from several related disciplines (*e.g.*, behavioral science, management science, mathematics, and computer science).

Although different, Corcoran's organization of "popular" areas is logical. It starts with a summary of many classical studies in behavioral research (Chapter 2). Corcoran's reason for starting with human behavior is to emphasize the fact that cost accounting operates in a human environment. The utility of cost accounting is a function of communications, goal congruence, responsibility/authority, *etc.*, and technical accuracy. He reiterates this point in critical discussions throughout the text.

After discussing classical behavioral studies, Corcoran adds his own thought-provoking observations on the topic. He questions several of the behavioralists' conclusions, such as, Argyris' suggestion that "organizations can be modified so that they offer increasingly meaningful challenges and opportunity for responsibility" (to their employees).

Corcoran's purpose in asking such questions is to instill in the reader a similar questioning attitude. The student learns how a given procedure is done and then asks why it is done that way and how it can be improved. This attitude holds through most of the later chapters and reflects one of the objectives which Corcoran enumerates in the preface of *Costs*—"to provide a forum for the exchange of ideas."

Having set the human side of the cost accounting stage, Corcoran moves through the cost accumulation phases of accounting (Chapters 3 through 11). The logic of his organization is evident in that he keeps related topics together and in a predictable sequence. For example, job order costing and process costing are in adjacent chapters, so their differences and similarities stand out. Furthermore, since process costing is simply a cost allocation scheme, Corcoran includes other allocation processes (*i.e.*, joint- and by-product costing) in the process cost chapter.

In these cost accumulation chapters, Corcoran uses mathematical notation which is not usually found in cost texts. Generally, this notation aids the presentation. For example, his job order costing chapter is clear, complete, and *concise* (only eight pages), because he developed the job order cost concept around the equation

$$\text{Total Costs} = \sum_{hijk} \text{Cost}_{hijk}$$

where

h = month
i = cost type (material, labor, overhead)
j = job
k = department

In order words, job order costing entails little more than a faceted coding system.

Occasionally, Corcoran's symbolism gets in the way of accounting; *i.e.*, the accounting concepts would be much easier to see and understand without the mathematical notation. Corcoran's discussion of the time value of money is a case in point.

Corcoran moves to the decision-making (managerial) phase of cost/managerial accounting after he completes the accumulation phase. The delineation of the two areas is not exact, because Chapters 8 through 11 contain important discussions on both decision making and cost accumulation. Beyond Chapter 11, the text deals principally with mathematical models and management decisions. This is the section in which Corcoran's integration of concepts from related disciplines makes his book unique.

Corcoran demonstrates the application of several management science models to accounting topics fairly completely in this latter section. For example, in his Inventory Theory and Cost

Control chapter he goes beyond the typical inventory management coverage, such as LIFO versus FIFO versus weighted average concepts, perpetual versus periodic systems, and elementary EOQ analysis. He adds models for inventory shortages, delayed replenishments, probabilistic conditions, *etc*. He also includes several useful computer programs for inventory analysis.

Corcoran was able to cover all this material without excessively long chapters by skillfully employing matrix algebra to reduce some very cumbersome explanations of conventional computational procedures. His use of matrix algebra and other mathematical and statistical procedures is one of the unique (and strongest) features of the book. Ironically, it is probably the most limiting feature as well, because many cost accounting courses are service courses. They are offered to both accounting and nonaccounting students. The mathematics in Corcoran's book are likely to be beyond most service-level students' abilities.

Corcoran mentions some class tests of his book in the preface. In the one test of the whole book (as opposed to selected chapters), he handpicked his students. Since they were largely graduate mathematicians, engineers, and accountants, they probably had computational skills far superior to the typical undergraduate cost accounting student. These handpicked students reported to Corcoran that they needed at least two semesters to cover the book. In the reviewer's opinion, the book is too advanced for the typical undergraduate cost accounting student to cover in two semesters unless prerequisites for the course include a second-level statistical methods course, a matrix algebra course, one programming course, and calculus. An ideal application for *Costs* is a course for engineers and mathematicians who are picking up some accounting in their upper-class or graduate program.

Corcoran has provided appendices to fill gaps in the student's mathematics and statistics training. However, these appendices are adequate only if the student's background has left virtually no gaps.

The heavy mathematics orientation creates another problem. Students may have trouble setting up some problems on the CPA exam if they have studied from Corcoran's text, because they may have emphasized the matrix algebra approach rather than the worksheet approach used in many CPA problems. The paucity of CPA- and CMA-adapted problems in the text lends credibility to this concern.

One final observation: Corcoran's writing style is varied and fun to read. He moves from the typical accounting exposition (which is usually dull) to poetry to play scripts to tabular examples to plain old preaching. Once he uses a footnote which is almost half a page of small type to preach the virtues of allowing private firms to manage forests as opposed to dedicating vast wilderness preserves. Generally (as in the forest management case), Corcoran's sermons take the reader far off course. Sometimes they fail to bring him back. Nevertheless, the side trips are an interesting change of pace. *Costs* is a refreshing new approach.

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JOE J. CRAMER, JR. and CHARLES A. NEYHART, JR., Editors, *Conceptual Framework for Financial Accounting and Reporting: Present and Future* (University Park, Pennsylvania: Center for Research, College of Business Administration, The Pennsylvania State University, 1976, pp. v, 88).

This monograph contains six papers, four responses, and two syntheses presented at a symposium held at The Pennsylvania State University on April 29-30, 1976. The participants seemed to share a general view that before a conceptual framework could be developed, an agreement on the objectives of financial statements must be reached. Two viewpoints relating to the objectives of financial statements prevailed throughout the symposium: the accountability approach and the user's need approach.

The first paper was presented by William J. Schrader, who used an historical approach to defend the validity of conventional accounting. He contended that historical cost, current value, and discounted value were not a matter of measurement, rather distinctive fields dealing with utterly different classes of phenomena. As such, they represent three different *accountings*. Schrader then praised conventional accounting as an evolving empirical science dealing with experiences replicated thousands of times over by many generations. Mimi Burke responded favorably and added that the proposals to replace historical-cost accounting had not been demonstrated to be superior.

The next paper, "Principles or Fantasies," was presented by Quiester Craig. By referring to Rule 203 of the AICPA *Code of Professional Ethics*, Craig complained that the FASB failed to cope with large issues, played politics, and operated out of fear of the SEC. As such, GAAP were neither "reasoned" principles nor responsive to users' needs: rather they were "fantasies" of the rule-making body.

Arthur R. Wyatt called for the establishment of a *single* conceptual framework for financial accounting. After examining several alternative concepts, Wyatt selected an asset-liability approach with emphasis on the economic changes in values of assets and liabilities. He contends that this approach reflects a change from income measurement to command over economic resources. Sybil C. Mobley took issue with the asset-liability approach by invoking the transactions approach, the realization principle, and the matching principle. Keith W. Lantz responded that alternative conceptual frameworks were simply competing information models and that it would be naive to expect any one model to represent fully all economic facts related to a given entity.

William G. Shenkir's paper provided the audience with a review of the FASB's step-by-step project on the development of a conceptual framework for financial accounting. Martin S. Gans responded by contending that the Board's step-by-step approach was too slow. Gans was particularly critical about the Board's constant barrage of rules, standards, and procedures without benefit of concept or rationale. Charles A. Neyhart responded that the Board should adopt a methodology based on sound theory and develop testable hypotheses. He rightly pointed out that without a conceptual framework, all the SFAS's must be characterized as interim and tentative. Kenneth P. Johnson approached the issue from a practitioner's viewpoint. He called for a compromise between the extremes of strict logic and subjective judgment, with due consideration given to the political aspects of our environment.

Johnnie L. Clark summarized the various views presented. Jacob G. Birnberg's synthesis sounded more like a paper of his own than a synthesis of the different views and ideas presented. He argued that since accounting was purposive in the *real world*, emphasis would be placed on the purpose of financial accounting. He proceeded with an examination of the environmental conditions characterized in the first instance by committees composed of representatives of diverse groups. Since the process was fraught with political considerations, he concluded that a framework must be accepted by fiat. Joe J. Cramer, Jr. and Charles A. Neyhart presented the "Need for a Definition of Financial Accounting." They claimed that a large part of the confusion that characterized the profession was due to the existence of competing definitions of financial accounting and that the issue of objectives of financial accounting was intricately linked with, and inseparable from, the problem of definition. In addition, they suggested a "components approach" to the disclosure of entity activities.

While several diverse viewpoints relating to a conceptual framework for financial accounting were presented at the symposium, the range was fairly narrow. In brief, three views were discussed: an historical approach, an asset-liability valuation approach, and the FASB's approach—whatever it is. While the basic theme was "the conceptual framework for financial accounting," the discussions were surprisingly lacking in depth, particularly in structural and theoretical terms. As an empirical discipline, the conceptual framework of accounting must methodologically be constructed in terms of logical consistency and empirical correspondence. Except for a few passing remarks, the symposium was distinctly devoid of papers on research methodology in accounting.

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BARRY E. CUSHING, *Accounting Information Systems and Business Organizations,* Second Edition (Reading, Massachusetts: Addison-Wesley Publishing Company, 1978, pp. xi, 557, $16.95).

One of the most pedagogically difficult courses to develop is the undergraduate course in systems for accounting majors. The detailed study of data handling procedures, document flows, and machinery is uninteresting to students and professors alike. The course quickly shifts to the process of systems design and away from the result of the design.

Determining the scope and depth of a course in accounting systems is primarily a qualitative choice on how deeply accounting majors need to go into the design detail. It is very easy to lose students in the detail of COBOL, inventory algorithms, and machine selection. But, it is also very easy to be so superficial that students cannot remember terminology. The material is so abstract in relation to the average student's experience that some detail is necessary for learning even the basic concepts. *Accounting Information Systems* provides a judicious blend of design process and result, design generalities, and detail.

The text is most appropriate for undergraduates who have just completed introductory financial and managerial accounting. The students should have had very little exposure to computer technology or intermediate financial accounting. The text provides a survey of technology and technique that would be redundant for the advanced student. The text is most appropriate for a survey course that has the primary objective of building awareness and vocabulary relating to computerized accounting processes.

The second edition has very few, but important, changes from the first edition. New material has been added on coding, data base systems, and EDP controls. The exercises and cases have been expanded with many choices of problems from recent professional examinations. These problems add both depth and breadth to chapter material and should be given consideration in course development.

In addition to the general-awareness-building strengths of the text, there is an excellent introduction to flowcharting as an analysis tool. The text distinguishes among document, systems, and procedure flowcharts, with a heavy emphasis on the first two types. The developmental framework for flowcharting is unique among texts in this area.

Other excellent areas in the text are the early emphasis on responsibility accounting and the full development of project scheduling through PERT. Fundamental issues in project management and computer acquisitions are also given an excellent treatment.

In a text for accounting majors, one should expect a substantive presentation of the AICPA internal control requirements. This text limits internal control issues to one chapter with nine pages on procedural and application controls and three pages on EDP audit and review. However, the brief coverage does present the major issues of concern. Further, texts with extensive coverage of EDP controls frequently tend to be discussions of detailed lists of procedures.

In a text with "organizations" in the title, pervasive emphasis on behavioral issues, especially with regard to the difficult group process problems in system design and implementation, might be expected. This text limits behavioral issues to one chapter and occasional chapter subsections. Although the behavioral discussion is limited, it is certainly more developed than most texts at this level.

In summary, the text is most appropriate for a first course in systems immediately following introductory financial and managerial accounting. The second edition adds new material on coding, data base systems and internal controls. The exercises and problems add significant depth to chapter materials. Although the behavioral and internal control issues could be presented in more depth, the text provides an appropriate survey of systems material for accounting majors at an early stage in their curriculum.

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PHILLIP EIN-DOR and ELI SEGEV, *Managing Management Information Systems* (Lexington, Massachusetts: Lexington Books, 1978, pp. xiv, 191, $18.00).

The authors have two principal objectives for their book. The first is to organize systematically for study the factors that affect the success or failure of an MIS project. The second is to discuss the varieties of situations that may arise during the development, implementation, and management of an MIS and alternative methods for dealing with those situations.

These objectives are accomplished in this nine-chapter book by devoting four chapters to MIS concepts and issues relating to the MIS environment. Another four chapters discuss behavioral issues relating to executives, users, and implementers. The final chapter integrates and elaborates on the previous chapters.

The topics covered in this book are not new. What makes this book unique and attractive to a selective class of readers is its level of approach. Absent are flowcharts, decision tables, Gantt charts, numerical examples, and lists of standards. The authors prefer to focus on the broader issues that face an organization and its members in dealing with an MIS. Procedural details are left to other books and articles that treat a narrower range of topics in greater depth. This book will therefore have its greatest appeal to members of upper management, to systems analysts, and to academicians with an interest in the area. The book does not appear to be intended as a text since there are no questions or problems at the end of each chapter. However, each chapter does contain a list of suggested readings and, with the exception of Chapter 1, a table summarizing the major issues raised in the chapter. A reader for whom time is at a premium would be advised to read Chapters 1 and 9 in their entirety and the summary tables of Chapters 2 through 8.

Chapter 1 presents an introduction to MIS concepts, drawing heavily on the works of

Anthony, Simon, and Forrester. In this chapter the authors present their criteria for a successful MIS: profitability, performance (in terms of improved quality of managers' decisions), application areas (a focus on major problems in the organization), user satisfaction, and widespread use.

The next chapter deals with the MIS environment, relating it to the organization's internal and external environment. Included are issues such as organization size and structure, decision-making time frame, organizational maturity, and resources available both inside and outside the organization.

The third chapter introduces the concept of the MIS target which is "the organization's definition of its overall approach to the development of management information systems and their purposes." Included are discussions of priorities, subsystem goals, and documentation. The MIS target strategy is presented as being multidimensional, the dimensions being the plan of attack (for example, bottom-up or top-down), the degree of integration, and the readiness to pioneer.

The MIS project itself is the subject of the fourth chapter. Topics discussed include execution as well as overviews of the technological, organizational, and behavioral aspects that will impact on the success or failure of the project.

The next four chapters focus on the roles played by three groups of individuals. A particularly interesting section discusses the differences in the perspectives of systems analysis and programmers.

The final chapter presents additional material, such as processing capabilities, data classifications, and data bases. In addition, the authors use this chapter to integrate the material previously presented and attempt to demonstrate how the book's organization fits the concept of information systems developed by Mason and Mitroff.

Overall, this book achieves its stated objectives by presenting a concise and incisive treatment of the major conceptual and philosophical issues that must be resolved if an MIS is to be successful. If the reader desires either a more detailed treatment of these issues or a discussion of procedural details to be followed during the various phases of an MIS project, a variety of other sources should be consulted.

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Adolf J. H. Enthoven, *Accountancy Systems in Third World Economies* (Amsterdam/New York: Elsevier North-Holland, Inc., 1977, pp. viii, 359, $32.95).

This work marks the second major effort by Enthoven in the area of accountancy and economic development. His earlier work, *Accountancy and Economic Development Policy* (1973), was a pioneering attempt to relate these important areas.

This work clearly builds on his earlier effort and reveals his continuing professional involvement with the accountancy professions of many of the developing countries as well as his thorough knowledge of the present efforts in this area of the major international political and economic organizations. Enthoven credits the Ford Foundation for the sponsorship of this study. He conducted extensive surveys and on-site reviews during the years 1973-76. He also drew on his discussions with administrators of the World Bank, The International Monetary Fund, and several regional development organizations. In addition, he reviewed the programs and publications of those organizations that relate to accountancy and economic development.

He states his goals for this work to be, "1. To analyze and describe prevailing micro and macro accountancy systems, procedures and practices. 2. To appraise developments pertaining to accountancy methodology. 3. To delineate ways and means to improve accountancy methodology. 4. To outline specific steps of potential use to country, regional and international bodies for pursuing warranted changes" (p. 1). He has deliberately attempted also to provide a general framework for the accountancy discipline as it is related to economic development. He describes the structure and process of accountancy in an economy from a conceptual viewpoint (Chapters 2 and 3), and the present systems of accountancy and the indicated areas for improvement (Chapters 4-7). These two sections are necessarily quite broad in scope and generally stated. He then moves to an outline of recommended improvements of what he terms "infrastructural" accountancy aspects (Chapters 8-15). More than half of the book (Chapters 16-32) is devoted to the presentation of the structure of the accountancy patterns and specific requirements for various countries in Africa and Asia.

As he mentions in his first chapter, "This study is not conceived as being the final word. The problems are too vast. Further assessments and a considerable degree of experimentation are needed within countries, regions, and internationally to make a variety of changes and improvements conducive to the needs of these economies." The study does provide us with a great deal of both current and new information of accounting developments in key countries in our present world. Even though necessarily general in scope, the latter half of the book, dealing with many national accountancy professions and their present and potential role in economic development, are important contributions to this special area of accounting literature.

He utilizes some relatively new or not generally accepted terms and classifications. This may trouble some readers. For example, he subdivides enterprise accounting into three activity groups, "1. Private enterprises; 2. Government enterprises (*i.e.*, parastatal units and East African corporations); [and] 3. Cooperative and other public sector activities (*i.e.*, primary cooperative societies, cooperative unions, and Ujamaa villages)." His classification is interesting and has some usefulness for analytical purposes. Unfortunately, the distinction by many accountants between government enterprise accounting and public sector accounting is not that clear. It would have been helpful if a glossary of specialized terms had been provided. In addition, Enthoven frequently employs so many adjectives that the impact or true focus of that subject is weakened. But these reactions of the reviewer are not major in relation to the important effort of the author to provide us with a comprehensive review of the present and possible future roles of accountancy in economic development. This is important to us as accountants and also as global citizens.

His efforts in the latter part of his book, where he describes the accounting professions of various developing countries, perform somewhat the same purpose as the publication of the American Institute of Certified Public Accountants, *Professional Accounting in Thirty Countries*. Whereas the latter study concentrates almost exclusively on the accounting practices for publicly held companies and the various national rules relating to this effort, Enthoven adds a significant amount of material describing various national laws and practices in areas related to accounting generally. His scope is much broader and provides important information on the present status of education and training for accountancy in the selected countries. Present activities in the public sector relating to accounting and a report on the current status and research in this broad area are also provided. This information is important for any attempt at an overall assessment of the status of accounting in various nations. It is also essential for any future legitimate effort of an international organization to specify reasonable and uniform rules for the accounting profession in the hope of furthering economic development.

Enthoven is a vocal and effective spokesman of the importance of the role of accountancy in economic development. His work is necessarily general because of its international scope. It also deals with a very active and changing profession; thus, the matter of continuing accuracy of many of his national reports for the near future is an accepted limitation on the long-run value of his book. Nevertheless, the report based upon 16 different countries does provide grounds for some very useful overall generalizations on the present contributions of accounting to economic development and to the potential of our discipline in this important area.

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PAUL M. FISCHER, WILLIAM JAMES TAYLOR and J. ARTHUR LEER, *Advanced Accounting* (Cincinnati, Ohio: South-Western Publishing Co., 1978, pp. 851, $17.25).

In their preface, the authors note that this text presents eight independent study topics: Real Estate and Franchise Accounting; Income Presentation, including earnings per share, interim and segmental reporting; Business Combinations; Foreign Operations; Partnerships; Governmental and Not-for-Profit Accounting; Estates and Trusts; and Insolvency. The attempt to explain these topics intelligibly, logically, and concisely is admirable; however, the authors have produced a product similar to all other advanced accounting textbooks—only fair, but with certain excellent features.

This comprehensive book provides the teacher with a broad enough base to bring to his students' attention many of the critical issues facing the accounting profession today. The numerous questions, exercises, and problems following each chapter are excellent and progress from those requiring little analysis and knowledge to those requiring complex analysis and extensive knowledge.

However, the discussion of theory is limited and lacks depth. Theory is explained through extensive quotations from authoritative pronouncements. Students taking advanced accounting have these authoritative pronouncements; what they do not have is concise, understandable explanations. They will not find such explanations in this book.

An advanced accounting textbook is successful if it contains lucid explanations of the theory, application, and ramifications of business combinations, which generally represents approximately 40 percent of such a text. Like other advanced accounting texts in use today, this book only partially meets this requisite.

Although consolidating affiliated businesses is a mechanical operation, the student should be introduced to some theory. In this text, the proprietary and entity theories are not discussed; the merits and demerits of purchase and pooling are barely covered, and nowhere is there a discussion of eliminating only the parent's share of intercompany profits of a less than wholly owned subsidiary.

Statements about the presentation of minority interest in a consolidated balance sheet, investor accounting for the effects of an investee's capital transactions in an investor-investee relationship, and the taxability of intercorporate dividends are confusing. The section explaining reciprocal stockholdings is neither rigorous nor extensive. Examples explaining the mechanics of consolidation are generally good; however, examples should not illustrate incorrect methods, and they should not use data presented in a previous chapter without repeating such data. It is difficult enough for a student to continuously switch an advanced text from the horizontal to the vertical to read work sheets without requiring him to turn back to a previous chapter for a current example.

The authors do present the cost and equity methods of accounting in a concise and understandable manner. Their schedule analyzing the distribution of the purchase price of a subsidiary is good, as is their use of "T" accounts to present the distribution of parent and subsidiary income.

The chapters on the less familiar topics of governmental and not-for-profit accounting are good. The many examples with journal entries adjacent to the events they record make these subjects understandable. The explanation of the various funds and the presentation of their statements provide an understanding for the student who will not do further studying in this area and, at the same time, provide a solid foundation for the student who will continue his studies.

The partnership chapters are good, especially the one on ownership changes and liquidation. Insolvency, especially bankruptcy, is presented well; however, more could have been done with Chapter XI proceedings. The chapter on estates and trusts is sparse; the discussion of gift taxes and stepped-up bases is not relevant.

The income statement chapters are good, especially the one dealing with *APB Opinion Nos. 28 and 30* and *FASB Statement No. 16*. The historical perspective and the examples are good; however, if the author had explained rather than quoted, these chapters would have been excellent.

This book is equal to other advanced texts in use today. The comprehensiveness of the material provides an extensive base from which the instructor may proceed. The questions, exercises, and problems are an excellent aid for the student to learn the subject and to test his knowledge. However, between this base and the tests the authors have left much supplementary work for both student and teacher. Perhaps, someday, the best of each advanced accounting text will be integrated in a book that will be rigorous, understandable, concise, and comprehensive. Until then, more will be required of students and teachers of advanced accounting than is required of their colleagues in other areas of the discipline.

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DAVID A. R. FORRESTER, *Schmalenbach and After, A Study of the Evolution of German Business Economics* (Glasgow: Strathclyde Convergencies, 1978, pp. v, 90, $8.00).

The development of the field of Business Administration in Germany has had a major impact not only on the entire European continent and Russia, but also on Japan. In addition, these ideas have spread to the Middle East and —via France—into large parts of Africa. Strangely enough, these developments have been ignored to a considerable extent in the Anglo-Saxon countries. Forrester's book is a major contribution to overcome this lack of understanding and, at the same time, provides an assessment of continental thought from a British point of view. This in itself is very enlightening, because it focuses on differences and similarities not perceived in the same manner by individuals from continental Europe who previously have attempted such assessments.

Forrester's analysis emphasizes the historical background and shows how early ideas shape present developments. It is also a biography of Eugen Schmalenbach (1873-1955), whose ideas and contributions have influenced German business theory and accounting to the present day more decisively than the combined ideas of his contemporaries. The book contains the following chapters: I. Introductory, II. Schmalenbach The Man (both biographical), III. Commercial Education and Business Economics, IV. Practical Accounting (both chapters provide historical background), V. Dynamic Accounting, VI. Charts of Accounts, VII. Costs and Prices, VIII. Finance, Capital and Labour (dealing with Schmalenbach's approach to accounting and business economics), and IX. And Beyond. Schmalenbach's Dynamic Accounting, which in a coherent and consistent manner explains financial statements as period-linkage (balance sheet) and period analysis (profit and loss statement), has been described by other authors in Britain and the U.S. Similarly, his uniform chart of accounts (which represents the basis of most European systems) has received some attention before. However, nowhere else have these been discussed as part of a coherent theory of business and an integral parts of management decision principles. As early as 1920, Schmalenbach developed a theory of effective transfer pricing (*pretiale Lenkung*), which resulted in values today labeled "shadow prices;" this he accomplished despite a total lack of appropriate mathematical tools at that time. His thoughts on inflation accounting (indexing) and his concise separation of "expenses" from "costs" (for decision making) are still the basis of much of today's writings. Schmalenbach's comprehensive, forward-looking approach may prove to be a logical basis for an integrated systems view of business administration as a field, which today still emphasizes the pragmatic approach over comprehensive theory construction. Above all, Schmalenbach established accounting as the core of business theory and management practice.

Forrester succeeds in stressing all these implications. Unfortunately, his book requires a substantial background knowledge to appreciate fully all his arguments and conclusions. This forces the reader to rely occasionally on background literature (which is well selected, cross-referenced, and summarized at the beginning of each chapter). One wishes that the author would have allocated additional space for such explanations.

Forrester's book has been well received in Europe and the U.S. (*e.g.*, it has earned Forrester the 1978 Hour Glass Award from the Academy of Accounting Historians). It is of particular importance to accounting students interested in international comparative studies and history of accounting regulations (and their future development), accounting historians in general, and individuals working in the area of accounting theory development—both financial and managerial.

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GEORGE FOSTER, *Financial Statement Analysis* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1978, pp. x, 581, $18.95).

Financial statement analysis has in recent years advanced rapidly from the traditional ratio analysis to a rigorous and integrated discipline which draws contributions from the related areas of accounting, economics, finance, and statistics. This book represents a highly successful effort by the author to accomplish the commendable and difficult task of providing a comprehensive integration of the enormous, yet scattered research and data in financial statement analysis into a well-organized text followed by interesting and useful problems and cases. With this latter material, he surpasses Baruch Lev, whose successful *Financial Statement Analysis* (by the same publisher) did not include problems or cases.

The problems and cases are both highly relevant and complementary to the text. With his rich and useful references and many insightful comments on the existing works in this field, the author has surpassed his own objectives of providing a text for second-year M.B.A. students and senior undergraduate students in accounting or business programs and also as a reference book for analysts. This book should be beneficial, too, to accounting and finance researchers who seek an overview of the recent developments in this area. Teachers who wish to bring recent research developments in financial statement analysis into their classrooms will find this book particularly helpful.

The book is divided into five independent and yet unrelated modules. Parts I and II provide the background materials necessary for financial statement analysis. Part I (Chapter 1) presents a formal model under uncertainty. The decision maker (DM) is assumed to be a linear utility maximizer with existing information. Based upon the cost-effective criterion, the DM decides on the needs for additional information and thus the content of the financial statements. Since the connection between this part and the rest of the text is through the derived demand for the financial statement information, the formal decision model framework becomes less clear in the remainder of the text. However, the author does emphasize the decisions which utilize the financial statement information and the features of the environment in which the decisions are made in the later chapters.

Part II consists of five chapters (2 to 6). Chapter 2 sets the foundation for the discussions in Chapters 3 to 6 by exposing students to various analytical tools for the traditional financial statement analysis. These tools include the cross-sectional and times series techniques for both the common-size statement and the financial ratio analysis and, in the case of time series, the trend analysis. In the subsequent chapters (3 to 6), important properties of accounting numbers are examined from all possible angles. For example, the use of industry norms as benchmarks for the cross-sectional comparison of financial statements and the possible use of economic factors to explain the differences in changes in the financial ratios are carefully discussed by showing how the past series of accounting numbers of a firm can be analyzed to provide some systematic pattern for forecasting purposes. Both the economy-wide and industry-wide factors are shown to be important in analyzing the financial statements of individual firms. Finally, the need to study the nature of the distribution of financial ratios and to study the correlation between financial ratios and the effect of accounting rules on financial ratios is discussed.

Part III (Chapters 7-12) concentrates on the financial statement information in the capital market setting. It starts out with the description of the role of financial information at (1) the aggregate market level (affecting the prices of traded securities) and (2) the individual level (influencing investors' portfolio and trading decisions). The assumptions and the implications of the much-misunderstood efficient market model are classified and examined. The author points out the usefulness of financial statement analysis in investment decisions and also emphasizes the features of the environment in which the decisions are made. The portfolio theory for investment decisions under uncertainty and the capital asset pricing model (CAPM) in the finance literature are briefly described. The empirical studies in the literature on the applications of the financial information are summarized and discussed in Part IV. These applications include the prediction of agencies' bond ratings, the prediction of yields on publicly traded corporate and municipal bonds, the prediction of corporate financial distress, and credit decisions by loan officers. Finally, Part V examines the influence and the implications of policies that regulate the firms' financial information made available to creditors, the investors, and some other external parties.

The distribution of materials covered in the text is uneven. Most of the materials are concentrated heavily in Parts II and III,, since most recent empirical and theoretical research progress, of course, has been made in those areas. However, there should be more coverage of the extremely important policy choice issue, as some progress related to policy issues has been made in the past few years. Given the author's own contributions to the accounting literature, he is to be commended for presenting some views and applications of the near-efficient market as well as those of the efficient market, *i.e.*, the Value Line Investment Survey and asset valuation models and investment decisions in a near-efficient market.

The insightful general comments by the author at the end of each topic are enjoyable. Quite often we are so involved in the analysis of certain subjects that we forget about their underlying assumptions and limitations and overlook the broader implications and possible extensions. The author's general comments have provided a useful reminder. One such comment throughout the book is on the lack of theory about the model examined.

The author has sought to explain (1) the properties of accounting numbers derived from financial statements; (2) the key aspects of decisions which use financial statement information, and (3) the environment in which the decisions are made. Along with the discussion of portfolio theory and capital market theory, empirical evidence relevant to the subject is emphasized and the related statistical tools are used extensively. To comprehend the material covered in the text requires more than a basic knowledge of statistics, econometrics (especially Chapters 4 and 5), and finance (especially Chapter 8). However, whenever additional analytical tools are needed for understanding the subjects, the author provides background material in brief but lucid appendices which present step-by-step examples illustrating ordinary least-squares regressions, Box-Jenkins time series methodology, multiple-regression techniques, and the estimation of abnormal returns of securities or portfolios in an efficient market.

In conclusion, this excellently written book provides comprehensive coverage of current topics in financial statement analysis. For schools that can afford to offer a more advanced course in financial statement analysis, this book is highly recommended.

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W. D. Hall and D. L. Landsittel, *A New Look at Accounting for Pension Costs* (Homewood, Illinois: Pension Research Council by Richard D. Irwin, Inc., 1977, pp. xxiv, 183, $9.50).

The purpose of this monograph is to develop a theoretical framework within which can be solved the issues of (1) how to determine employer pension expense per period; (2) whether unfunded pension benefits should be shown as a liability on the balance sheet of the employer; (3) how to value the assets in the custody of the pension plan; and (4) whether pension costs and liabilities of the employer should be computed in the same manner as that of the pension plan.

The authors, Arthur Andersen & Co. partners, acknowledge use of their firm's publications, *Objectives of Financial Statements for Business Enterprises* (Chicago, 1972) and *Accounting Standards for Business Enterprises Throughout the World* (Chicago, 1974), as a primary source in developing their approach to the issues. Their theoretical framework is designed to meet the general-purpose financial statement objective of communicating ". . . information concerning the nature and value of the economic resources of a business enterprise as of a specified date the interests of creditors and the equity of owners in the economic resources as of that date, and changes in the nature and value of these resources from period to period" (p. 22).

Economic resources are defined as "those elements of wealth that possess the three basic characteristics of utility, scarcity and exchangeability and hence have economic value" (p. 23). Exchangeability imposes new restrictions in the preparation of a financial statement. In order to be exchangeable, the resource must be separable from the rest of the entity resources. Thus, the item in question must be more than just a debit balance, such as deferred charges and goodwill. It must have substance in its own right. Economic value in the context of the objective of financial statements is present- and future-oriented. It is more relevant to financial statement users than value based on past transactions. Economic value more closely reflects economic realities and events as they exist and transpire.

In order to implement their basic ideas of economic resources and value, the authors conclude that some concepts and practices are outmoded and should be abandoned under the right set of circumstances. Casualties include historical cost, conservatism, and objectivity when pitted against relevance. Their most damaging indictment against current accounting practice is the tendency for financial statements to result in what might be considered an artificial earning stability that results from a selection of appropriate accounting practices. The true flavor and risk of an operating enterprise are subsumed when the up-and-down trend lines are smoothed by various amortization techniques.

After having established their objectives for financial statements, the authors conclude that the employer pension expense per period shall be the sum of (1) current cost associated with current employee earnings; (2) the actuarial present value of any past or prior pension costs that have been assumed during the current period; and (3) current pension plan gains or losses that have been experienced during the current year.

Current pension cost is computed by taking the ratio of projected benefits to total expected compensation as of the projected retirement date. This ratio times current compensation represents an amount necessary to be placed on deposit as of retirement date and so that the current cost is the present value of this amount during any given year of employment. The current cost recognized in any one year must be lower than that which is recognized in later years, because the earlier-year costs have more time in which to accumulate earnings for retirement. The result is a stream of costs which become greater with each passing year even if the compensation level is stable.

The authors reject the commonly accepted notion that the computed liability for prior- or past-period service on the inception date or modification date of a pension plan will benefit future years. They conclude that the liability should be recognized as such and remain on the employer books until funded. Looking at the debit side of the entry which recognizes the liability, the authors observe that since it is not an economic resource as defined, it must be an expense. They reject the APB Opinion #8 method of averaging gains or losses related to pension plan operations and projections, since it artificially stabilizes income. They suggest that gains or losses be recognized in the year of occurrence.

On the other issues, the authors are in agreement with what appears to be a current trend: they apply current value to the pension plan assets. Their computation of current pension cost is basically an adaptation of an actuarial method in arriving at pension liability which implies a desire to have similar approaches to the valuation whether it be on the books of the employer or the pension plan. In addition, the authors find that if the pension plan assets are exceeded by the actuarial value of employee-earned benefits in a defined pension plan, this amount, which represents unfunded pension benefits, should be shown on the books of the employee. The authors argue that the liabilities of a defined benefit pension plan are the liabilities of the employer, and a symmetry in reporting of this nature between the pension plan books and the employer books is desirable.

The authors' positions with regard to asset valuation and liability recognition are not consistent with current practice but are consistent with some current proposals, such as the SEC position on "reserve recognition accounting" in the oil and gas industry and the FASB's proposed treatment of differences between pension plan assets and the liability for defined pension benefit plans.

In addition to the monograph by the authors, the book includes a series of comments on the monograph by members of the Pension Research Council. The Council members include accountants, financial analysts, attorneys, actuaries, professors, and members of company management. In most cases, the comments were complimentary on the effort but lament the authors' lack of understanding in specific areas. Usually the specific areas were the specialties of the complaining Council members.

This book's strongest attribute is an exposition of what might be considered the Arthur Andersen & Co. approach to financial statement objectives and purposes. It is the type of book that might be assigned as outside reading while studying pension plan problems. The comments of the Pension Research Council enhance the value of the monograph. But the reading should be supplemented by a review of the Arthur Andersen & Co. monographs mentioned earlier and *Accounting Research Studies #1 and #3.*

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Anthony Hilton, *Employee Reports: How to Communicate Financial Information to Employees* (Cambridge, England: Woodhead-Faulkner Limited, 1978, pp. xiv, 113, £12.50).

In this book, the Editor of *Accountancy Age* examines the scope, form, and benefits of employee reports. Although no legislation in the United Kingdom requires firms to distribute to their employees a special financial report, Anthony Hilton indicates that his country probably leads the world in the quantity of such employee reports produced. Beginning in 1977, *Accountancy Age* initiated an annual competition to find the best British employee report, so the author brings to his book the knowledge gleaned from this contest.

Hilton's strong preference for a separate report for employees is revealed on page 3, "Even shareholders do not understand the shareholders' report. . . . The employee fares even worse, because much of the information in the shareholders' report is not relevant to him. . . . So it is worth getting rid of the notion that the shareholders' report is any good at all for employees."

Two chapters focus extensively upon the detailed employee-report disclosure recommendations set forth by management (the CBI) and labor (the TUC); the author should have revealed somewhere in his book that those initials represent the Confederation of British Industry and the Trades Union Congress. While Hilton finds both organizations' proposals "of value to anyone beginning to do work in this field," he faults both groups (pages 41-42) for (1) failing to give any system of priorities for information, (2) veering a long way from the transmission of straightforward financial information, and (3) being muddled as to the objectives of the employee report. In the next chapter, the CBI and TUC proposals are compared and contrasted with those of three other groups, such as the 100 Group, an influential organization of top industrial accountants in the United Kingdom.

A chapter is devoted to a case study of the 1976 employee report of Staffordshire Potteries, judged to be the best such report entered in *Accountancy Age's* first contest. Some 60 most enjoyable illustrations from 35 different employee reports are situated at this point in the book, including four from the winning Staffordshire Potteries report; incidentally, since the 72 pages of illustrations are not numbered, this book actually consists of 185 pages. Some of my favorites are, "Greenall Whitley points out that the 52½ million pounds it paid in taxes could build 45 miles of motorway or it could provide wages for 17,500 nurses" (Illustration 11). Tarmac titles its report "How we fared in a tough year—when one in twenty of the U.K. workforce had no job" (Illustration 21). An annotation presented by the U.K. subsidiary of Nissen on its balance sheet reads, "Why no 'Goodwill' in the Fixed Assets? Well, Goodwill is like a lady's smile . . . something to be valued but never priced" (Illustration 42).

The four judges of the *Accountancy Age* contest are identified, and the views of each judge are summarized so the reader can ascertain what each was looking for in the employee reports examined. Throughout this part of the book, Hilton makes very effective use of the illustrations, constantly referring to them to depict what constitutes exceptionally good or faulty content presentation.

Many readers might not be willing to endorse Hilton's view (p. 93) that ". . . it is a waste of time explaining inflation accounting to employees. Few enough directors and accountants believe in it (or understand it). There is not the remotest chance that employees will accept it."

In summary, the overall assessment of this book is highly favorable. Hilton very adequately achieves his objective of explaining the scope, form, and benefits of employee reports. The 60 illustrations are most interesting. Despite Hilton's periodic diatribes directed at the accounting profession, readers will find *Employee Reports* informative and enjoyable reading.

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THOMAS D. HUBBARD, LARRY N. KILLOUGH and RONALD J. PATTEN, *CPA Review: Practice, Auditing, Law* and *Solutions*, Second Edition (New York: John Wiley & Sons, Inc., 1978, pp. viii, 1059 and pp. 340, $39.95).

As with any text, and particularly a CPA Review, the question arises as to how much material should be included and how much should be left to supporting publications. To many, the financial accounting area is of prime importance, but many authoritative pronouncements do support this area; therefore, it is important that other areas, with fewer authoritative pronouncements, be presented completely and understandably. The strength of this second edition, as it was in the first, is that it does just that. The non-financial accounting areas are excellent and will need minimum supplemental materials, while the financial accounting area offers a basic review with references to authoritative pronouncements.

The main purpose of the second edition has been only to update both current professional pronouncements and CPA Examination questions used or referred to within the text. The number of chapters and basic chapter sequence and organization have remained unchanged from the first edition. Chapter 1 is an introductory chapter; Chapters 2 through 5 are the Financial and Tax chapters; Chapter 6 is Cost-Managerial, with Chapter 7—Auditing, Chapter 8—Business Law, Chapter 9—Fund Accounting, and Chapter 10 a simulated CPA Examination. Chapters 2 through 9 include a mixture of text, illustrative questions and answers, and review questions, with answers in a separate, soft-cover solutions volume.

No information is included on future examination dates or on the requirements of the various states to sit for the examination. The organization of each chapter varies. In all cases, the review questions appear at the end of the respective chapters, with reference to the particular exam and part, but the relative mix of text and illustrative questions varies. The approach where the text material and illustrative questions are intermixed by subject area is much more beneficial to the user and allows for less time in searching for appropriate illustrations and questions. Like most CPA Review texts, the income tax area is almost exclusively review questions. The major emphasis in the financial accounting area is on problem solving. The official pronouncements of the AICPA and FASB are referenced for the user, but they are not outlined, and many difficult areas are left with minimum discussion. For example, on the subject of leases, pages 28 and 29 offer a general discussion with the following concluding statement, "One of the most complex problems in the area of leases relates to financial-statement presentation and disclosure. FASB Statement No. 13, issued in November of 1976, is the current authoritative source in accounting for leases. This statement covers lessee and lessor accounting and is a must in the candidate's review."

The chapter on cost-managerial accounting is a well-integrated chapter of text material and illustrative questions. The chapter on auditing is also a well-organized chapter and a comprehensive review of the subject. Text and questions are not only referenced, but the important ones are also capsulized and included in either the text or the answers to the illustrative questions. This is particularly true of the Code of Professional Ethics.

The Business Law chapter, similarly to the

Income Tax chapter, basically outlines important topics, followed by review questions broken down by major subject area. The Fund Accounting chapter summarizes the basics for the user by different funds. The last chapter, a simulated CPA examination, offers the opportunity to sit for the exam in the surroundings of your choice.

This CPA Review text offers a great deal to all users, since it does provide, as the authors state, "comprehensive material suitable for use in a CPA Review course, a capstone course in professional accounting problems, or the basic material for a self-study program." I recommend the book highly.

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STEPHEN E. LOEB, Editor, *Ethics in the Accounting Profession* (New York: John Wiley & Sons, Inc., 1978, pp. 479, $9.95).

In this text, Hillel is quoted as saying, "Do unto others as you would have them do unto you! All else is commentary!" which, in essence, describes this book of articles and essays on accounting ethics. It is a well-organized and diversified commentary addressed to specific areas of accounting practice and the special ethical considerations implicit in them. The contents run the gamut of philosophical semantics to pragmatic codes of ethical behavior.

The book is separated into six topic areas. These include morality, professionalism, and ethics; the current state of certified public accountants' ethics; the ethics of tax practice; ethics and management services; violations and enforcement; and the future. In an introduction to each part and to each sub-section, the author provides the reader with a concise preview of the material to be presented. Following each introduction is a listing of one or more additional references. Each part concludes with review questions alone or review questions followed by problems.

There are 33 articles and essays as well as other types of material pertinent to each subject. Primary sources are classical essays, journals of accounting associations, and the publications and pronouncements of the AICPA. Approximately three-fourths of the materials were published or issued after 1966, and over half, during the 1970s.

The first part on morality, professionalism, and ethics is clearly the most philosophical section of the book. It explores moral and ethical codes of behavior in general and the alternative routes toward moral decisions. A definition of professionalism and morality leads to an exploration of accounting as a profession and its responsibilities, as such, to its public.

The next part presents the Rules of Conduct and Interpretations of the Rules of Conduct from the Code of Professional Ethics of the AICPA, March 1975 edition, as well as a brief extract from the philosophical essay, "Concepts of Professional Ethics." The succeeding five sub-sections enlarge upon the rule areas of independence, integrity, and objectivity; competence and technical standards; responsibilities to clients; responsibilities to colleagues; and other responsibilities and practices. Extracts from "Concepts of Professional Ethics" directly applicable to the topic areas form a particular part of each sub-section.

Two parts examine the unique ethical problems of tax practice and management services. In the area of tax, the tax adviser's role of advocacy is contrasted to that of the independent auditor. Applicable codes for tax practice from the Treasury Department and from the AICPA Code of Professional Ethics are compared. The increasing provision of management advisory services by accounting firms is examined. Ethical questions center around audit independence, where these services are performed, and the competence of CPA firms to perform the services.

A part on violations and enforcement enters four areas: the role of the AICPA in promoting compliance with an enforcement of its ethical code; compliance with auditing standards, especially in the case of unpublished reports; the use of "foreseeability" as a determinant of audit responsibility; and the role of the SEC in setting controls and applying pressure upon accounting practice behavior. The concluding part focuses upon future ethics for the accountant in industry and government. The author feels that "in the future there may be greater emphasis on the conduct of accountants not in public practice." The since-resolved issue of advertising in the accounting profession is presented, and the section concludes with a brief delineation of modified general and technical standards submitted to the Council of the AICPA at the time of publication.

The pervasive theme throughout this manuscript is the concept that "in order to retain its autonomy and the privilege of self-regulation, a profession must satisfy society that it is doing a creditable job of regulating itself." This theme provides the internal integration of the parts of this book into a whole. The quality of the articles and essays is generally high, and the majority are readable, lucid, and well-organized. Only in a very few cases is the material either pedestrian, poorly organized, or wordy. Any book which combines the efforts of diverse authors on a similar topic will inevitably contain repetition and some redundancy. This book is no exception. However, a real effort has been made to allow this redundancy only when the article also provides some unique insight to the problem in question. A felt lack in the discussion of the future is the absence of any commentary on the specific implications for the accounting profession of the Moss and Metcalf investigations.

Loeb's stated purpose in compiling this book was to provide the reader with "an understanding of the nature of the ethical standards of the accounting profession and the problems relating to them." He has been successful. Suggested applications by the author are extensive and include use as:

1. A supplement to courses in auditing or business ethics, both on the graduate and undergraduate level.
2. A primary or supplementary text for a college course or seminar dealing with the professional responsibility or development of accounting.
3. Recommended reading for students or practitioners of accounting.

Two elements should be considered regarding the suitability of the book for these purposes. The discussion on morality, professionalism, and ethics could prove to be heavy going for the average business student, as well as for the accounting practitioner. It would require special effort on the part of the instructor to present it in a usable framework. The review questions and problems at the end of each part do provide an excellent discussion base for any educational situation and can aid the student in building an awareness of his own positive ethical decision responsibilities.

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G. B. LOWE, *CPA Business Law Review* (Cincinnati: South-Western Publishing Co., 1978, pp. iv, 296, $11.25).

This paperback book is designed for use in a review course in business law for CPA candidates. It includes material concerning all topics which may be expected to be the subject of business law questions, as listed in the latest edition of the AICPA's *Information for CPA Candidates*. Each topic is presented in an outline format, followed by both objective and essay questions that have appeared in recent CPA examinations. Answers to the CPA examination questions appear in the back of the book.

The topics covered in the early chapters are arranged logically, beginning with Contracts, then the Uniform Commercial Code subjects. The sequence of later chapters does not always position related topics close together; *e.g.*, Suretyship and Insurance are separated, Partnerships does not immediately follow Agency, and Federal Securities Regulation appears many chapters prior to Corporations.

The pages are large (8 by 10½ inches), and the text is outlined with generous use of bold print and italics. The amount of coverage given to topics is related to their emphasis on previous CPA examinations, although the quantity of material is not directly proportional to the frequency of a topic's appearance. For example, there are more than nine pages of text on wills, estate, and trusts, subject to relatively few questions, and four and one-half pages on the accountant's legal responsibility, a topic almost certain to appear in a CPA examination.

This book is intended for a review course, but the text material is not adequate for one who has not previously studied business law, and is considerably less detailed than the corresponding material in the similar book of the same title by Edmund F. Ficek, published in 1977 by Charles E. Merrill Publishing Company. However, the author's familiarity with past CPA examinations has enabled him to include legal rules and principles that have repeatedly been the subject of examination questions.

The insertion of questions from prior CPA examinations, following the text in each topic, is common for this type of book and is certainly very helpful to the CPA candidate. The inclusion of the answers in the back of the book, also quite common, reduces the usefulness for the teacher who would like to refer to the examination questions as a basis for class discussion. Accounting textbooks do not normally contain the answers to their questions and problems. In this reviewer's opinion, neither should a business law book, if it is intended for use in a course. This reviewer has found that discussion of possible answers with members of his class is an effective instructional procedure, and he has, for this purpose, compiled his own booklet of recent CPA examination questions, without answers.

In summary, this book provides an excellent outline of business law essentials for a CPA candidate. The inclusion of CPA examination questions and answers is very helpful for a candidate engaged in a self-study program. For use in a course, the book would be more suitable if it did not contain answers to the questions.

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R. K. MAUTZ and WILLIAM G. MAY, *Financial Disclosure in a Competitive Economy* (New York: Financial Executives Research Foundation, 1978, pp. vii, 147, plus 5 appendices, pp. 141, $5.00).

About 50 years ago, many major corporations were still resisting the disclosure of sales and cost of sales amounts in their annual reports. Such disclosures were considered to give competitors an advantageous insight into the profit margins on their, then singular, product lines. No authoritative standards existed to compel disclosure until the SEC, a few years following the enactment of the Federal Securities Acts, required it. Even so, this reviewer recalls a watch manufacturer's successful non-disclosure efforts until the early fifties. (The Securities Acts still provide for confidential treatment or non-disclosure—subject to SEC approval—of information that would be detrimental to a company's interests.)

While 50 years is not so long a period of time (for one who has lived through it), the financial disclosure environment has changed radically in the interim. "Notes to Financial Statements" were practically non-existent then, and the statements were capsulized; today the notes usually take up many more pages than the expanded statements themselves, and, in addition, we have required supplementary financial data. Sparked by the SEC's Regulation S-X, the accounting profession's standard-setting bodies gradually accelerated the disclosure explosion as they came to recognize the inability of statement captions and summarized numbers to tell the story which investors needed.

As this developed, businesses grew and diversified their operations, lines, and locales; they adjusted, sometimes reluctantly, to the need for more and more disclosure. They soon found that investors (and analysts) were made happier thereby, and that the diversity and complexity of their operations often made the disclosures sterile, from a competitor's standpoint.

But then it happened. The early 1960s saw the rise of the multi-product, multi-national, and conglomerate companies. Financial analysts were frequently stumped as they tried to unscramble numbers that often offset each other (usually the announced intention of a conglomerate, in an effort to overcome varied cyclical trends). They pressured the APB into issuing Statement No. 2 (not an *Opinion*, hence not obligatory), *Disclosure of Supplementary Financial Information by Diversified Companies* (1967), recommending product line reporting. As was to be expected, only when the SEC required such reporting (1969) did it come into vogue. Now, of course, the FASB has made it mandatory with FASB Statement No. 14, *Financial Reporting for Segments of a Business Enterprise* (1976).

Enough of history, which is *not* what this book is about. The research study reported upon here was the natural outgrowth of the aforementioned development of product line reporting (although it is not so specifically stated). The Financial Executives Institute's Research Foundation authorized and funded it in response, no doubt, to its membership's concern over the possible future impact of the ever-increasing disclosure requirements set by the powers-that-be—mainly the FASB and the SEC, and to some extent the FTC. In recent years, the FEI, as the spokesman for corporate finance, has taken an aggressive and positive approach toward the need to improve reporting, for which it should be commended.

This is the first research project into the costs versus benefits of financial disclosure related to "competitive disadvantage," so the researchers (Ernst & Ernst partners and members of their staff) had to start from scratch. Practically no literature or other hard data were available. That they could produce something meaningful —and it is that—about so abstract and elusive a concept in two and a half years (not continuous) of frustrating effort, is a momentous achievement. As a starting point for future research in this area (and related accounting studies of a behavioral nature), it will be invaluable. The objectivity of the principal researcher, Bob Mautz, is known to me personally, and I would not conceive of questioning the scholarship of the project. Although I am not enamored of behavioral approaches to accounting research, I wonder whether the aid of a behavioral scientist could have improved it or influenced it. Perhaps it is better for not having had that input.

Questionnaires are customarily used in dealing with abstract or esoteric concepts, but the one used for this research was no ordinary questionnaire. Not only was it exhaustive, but pragmatic to the core. Specific cases of disclosure or nondisclosure were presented (in addition to a wide variety of areas of interest to users), no doubt gleaned from their firm's vast experience. The respondents were asked to express views on each item concerning the costs involved (not just monetary, but particularly competitive disadvantage, negotiating disadvantage, and harm to the company and/or its present stockholders) versus the benefits (help to present or prospective investors) from the standpoints of both management and investor. The questionnaire was so complete (21 pages) that it is a wonder that 479 corporate executives and 147 financial analysts took the time to respond.

In addition, three seminars of from 15 to 25 corporate executives, financial analysts, academics, and representatives of regulatory organizations focused on five challenging cases designed to buttress and embroider the results of the questionnaire. It would be interesting to hear the tapes of those three-hour sessions.

The conclusions are set forth early in the book —a "Summary of Findings" and "Recommendations for Those Who Establish Financial Accounting Standards"—the latter being the basic objective of the study. But the more interesting parts are the discussions on contrasting views of financial disclosure, the nature of competition, financial disclosure and securities trading, the seminars, and particularly some misconceptions about financial disclosure. Some prevalent myths are explored and exploded: does business abhor financial disclosure? do financial analysts want every additional disclosure regardless of the impact on the economy or the company? Get the book and see what this unusual study has revealed. The responses to the questionnaire alone will keep you fascinated.

This is "must" reading for all those interested in financial disclosure and standard setting. The consequences of standard setting are presently uppermost in the minds of standard setters, accountants, and all businessmen. Speaking before the AAA Convention in August, Oscar S. Gellein, member of the FASB, said in his address entitled, "Neutrality Has Consequences": "Standard setters should be concerned about the impacts of their standards. They should be concerned before pronouncing as well as after. They manifest their concern principally by pronouncing standards that apply evenhandedly to companies across industries. Evenhanded treatment builds on objectives and concepts that continually search for real differences in risk and return, treats them differently, and avoids creating the appearance of difference where there is none . . . . But neither the standard setter nor those interested in the process should get carried away with the prospects of ascertaining in a conclusive way the consequences that ensue, let alone foreseeing the consequences that *may* occur. I would hope we could keep expectations within reasonable bounds to avoid bringing the standard-setting process to a screeching halt."

For those interested in the behavioral aspects of accounting research, much can be gained from a study of the questionnaire design and related methodology.

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LEVIS D. MCCULLERS and RICHARD G. SCHROEDER, *Accounting Theory: Text and Readings* (New York: John Wiley & Sons, 1978, pp. 577, $16.95).

A recent addition to the financial accounting theory texts is a book that contains 14 chapters, each of which is divided into three parts. A description of the topic under consideration is followed by two or three authoritative committee reports or articles from accounting periodicals and then ten to 15 questions.

The authors indicate in the preface that "the objective of this book is to provide the student a framework within which to operate by discussing various financial accounting topics and expanding upon those topics by including readings directly connected with each of the chapters." They also indicate that the book "may be used in several alternate ways: (1) . . . by itself in a course which is descriptive of existing accounting theory while critically examining alternatives, (2) . . . In a course designed to explore accounting theory in depth. To be used with the Commerce Clearing House *Accounting Principles—Current Edition*. (3) . . . In a normative accounting theory course in which the text is supplemented with the discussion memoranda which preceded the issuance of APB Opinions and FASB Statements. (4) . . . In a course designed to evaluate the conclusions reached by the APB and FASB through the use of the research articles contained at the end of each chapter and the supplemental readings."

Most of the chapters are devoted to the authoritative pronouncements of financial accounting theory; however, several chapters include topics of a theoretical nature. Chapter 1 includes the history of GAAP from the Committee on Accounting Procedure to the FASB and the role of the SEC. This is followed by a section on research methodology and includes seven approaches. Chapter 2, Income Concepts, is concerned with the theoretical income concepts and not with the official pronouncements. Income recognition, measurement, realization, and the matching principle are followed by a discussion of income recipients. Chapters 3 and 4, Financial Statements, include such topics as earnings per share, disposal of a segment, accounting changes, interim financial statements, and development stage enterprises. Chapters 4 through 7 complete the asset side of the balance sheet, with working capital, long term assets, and investments and intangibles. The authors then selected the specific topics of income tax allocation for Chapter 8 and leases and pensions for Chapter 9. In Chapter 10, the balance sheet classifications are revisited, and long-term liabilities are followed in Chapter 11 with a discussion of equities. The last three chapters include general purchasing power and current value, accounting for multiple entities, and financial reporting and disclosure requirements.

For each topic, the authors have described the authoritative pronouncements and brought out the theoretical concepts. This is accomplished in 14 pages, on the average, for each chapter. Chapter 1 requires 22 pages to give the history of GAAP and to discuss research methodology. Chapter 6 includes eight pages on long-term assets, including the SEC replacement cost requirements and a discussion of depreciation methods. While the selected readings supplement the brief coverage, this reviewer believes that senior and graduate level work require more depth. Most of the articles include footnote references to other articles, and students could expand their work by additional readings. A feature that would have improved the usefulness of this book at the level suggested would be the inclusion of an extensive bibliography at the end of each chapter.

The questions at the end of each chapter are primarily multiple choice. While credit is not given for these questions, there is a general credit in the front of the book for "material from the Uniform CPA Examination and unofficial answers . . ." that would imply the source of the questions. Problems and cases are not included in this text, and an instructor would need to supplement most topics with material in greater depth.

It is difficult to find a text for financial accounting that is up to date. This text is, and as an example, the authors discuss prior period adjustments and explain the changes in APB No. 9 that resulted from the issuance of FASB Statement No. 16. All of the significant material for a financial accounting theory course has been taken from the most recent authoritative pronouncements.

This text could be adopted for a one-semester course if the instructor supplements it with problem and case materials.

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REPORT OF A COMMITTEE CHAIRED BY J. E. MEADE, *The Structure and Reform of Direct Taxation* (London: George Allen & Unwin, 1978, pp. XVII, 533).

Tax reform tends to have a negative connotation. Too frequently the words are used to mean some type of simplified objective that the user of the term has in mind, neglecting all other effects that the measure might cause. In New York State, for example, the expression "tax reform" has been used to mean "soak the rich" without considering the fact that the low tax state of Connecticut is one step away. At the Federal level, grades have been awarded to legislators based on their votes for tax reform, where tax reform is defined in terms of whether the result increases or decreases the taxes of the poor people and rich people. An increase in the capital gains tax is defined to be a reform. The use of the term "tax reform" in these contexts gives it a bad name.

From England has come a book that succeeds in giving new meaning to the goal of tax reform. While restricted to the types of direct taxation (an income tax (or the equivalent) of individuals and corporations and capital gains tax), this book is "must" reading for anyone interested in tax policy. Well written, it is less interested in presenting conclusions than in presenting analysis and defining the premises on which the conclusions are based.

The book is the report of a committee chaired by Professor J. E. Meade. Professor Meade received the Nobel Prize for Economics in 1977, and nothing in the book casts doubt on his worthiness. Consider the following statement by the Chairman (p. XV):

> "Our economy has become too stagnant; restoration of standards of living and many desirable increases in economic welfare depend upon

> higher productivity. At the same time a modern humane society demands that effective action should be taken to prevent poverty and to remove unacceptable inequalities of opportunity, wealth and privilege. There may be some degree of inevitable conflict between these two objectives of "efficiency" and "equality." But the clash can be minimized by an appropriate choice of social, political and economic policies and institutions; and the structure of the tax system is one important element in the outcome."

Both the far right and far left will find much in this book to which to object. But everyone will find challenging thoughts. While written with the objective of reforming England's tax structure, it is equally appropriate for the United States. While the committee was chaired by a noted economist, the committee included experienced practitioners in tax law and accounting.

Of special interest to accounting professors are the definitions of income (pp. 31-32). Expanding on Hicks' famous definition, the report offers an alternative definition that deserves to be incorporated into the accounting literature. An individual's income may be defined (p. 31) "as the amount which he could consume in any one year and yet be left with the resources and expectations at the end of that year which would enable him to maintain that same level of consumption indefinitely in the future." This definition is equally as important as that of Hicks.

The major thrust of the book is to question the use of income and capital gains as the primary basis of direct taxation. Instead of income, it is suggested that expenditures be taxed and that the tax on expenditures be progressive. There would be tax relief for savings with the objective being to stimulate real investment. Consumption, not income, would be taxed.

Social objectives would be attained by placing a floor on minimum payments to individuals and by a progressive tax on inherited wealth or gifts (to achieve a wider dispersion of property ownership).

This committee differs from the conclusions of the Carter Commission (the Canadian tax report published in 1966) in that it recommends indexing for inflation. Adjustment for inflation is essential unless (p. 127) "we are ready to accept inflation as an extremely powerful but inefficient and unjust revenue raiser."

One of the more important changes in corporate taxation would be to allow the immediate expensing of purchases of capital equipment. This change would be accompanied by discontinuing the deduction of interest payments from the calculation of the taxable amount (tax base).

While the set of recommendations might sound revolutionary and likely to lead to an upheaval, it should be recognized that the committee also makes suggestions for implementation. The changes would be implemented gradually through time as the economy learned to live with the new rules.

A large percentage of the book is essentially a primer on public finance. All of Chapter 2 is devoted to defining and explaining the characteristics of a good tax structure, and throughout the book are scattered lessons in public finance.

This book deserves a wide exposure in the United States. It would be nice if the Ford Foundation were to send a copy to each Senator and Representative. Completely unhampered by the narrow, short-sighted focus of most tax reform publications, this book opens the door to the possibility of true tax reform. Tax reform conceivably would benefit not just one "class" of society but rather would benefit all members of society.

Too frequently, tax reformers make calculations as to the effect of a change on the after-tax income of a specific type of income recipient. This study takes us beyond such calculation to the basic questions as to what should be the objective of the taxation, and makes us ask ourselves whether the present law or the laws proposed by the present Administration lead to these objectives.

President Carter has called the tax laws of the United States a disgrace. Before he recommends further modifications under the banner of tax reform, it is strongly recommended that he read this book. The modifications resulting from such a reading will be different than the Administration's most recent tax reform proposals.

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EDWARD E. MILAM and D. LARRY CRUMBLEY, *Estate Planning After the 1976 Tax Reform Act* (New York: AMACOM, A Division of American Management Association, 1978, pp. vi, 230, $14.95).

Directed at the layman with sufficient wealth to have an interest in estate planning, this book makes a serious attempt to explain in narrative form those provisions of the Internal Revenue Code dealing with or affecting estate planning. The authors deal with an extremely difficult subject as effectively as can be expected, considering the complexities of the Internal Revenue Code and the Regulations that deal with trusts and estates.

One result could well be that a reader will determine that this is indeed a complicated subject and turn to professionals for assistance in estate planning. The book, in fact, recommends an estate planning team and encourages the person with assets to evaluate his or her estate plan and seek out competent professionals, to include an attorney, a certified public accountant, a trust officer, and a life insurance underwriter.

In some instances language from the regulations is used which is probably unfamiliar to the reader. A glossary of terms could be of assistance to a reader making a serious effort to read and comprehend the entirety of the book. Such terms as interpolated terminal reserve, depreciation recapture, and naked life estate may not be in the non-professional's vocabulary. In most instances the authors have attempted to explain terms used in the Internal Revenue Code that would be unfamiliar to their readers. The authors state in several chapters that the federal estate tax laws are quite complicated. Sentences appear that will confuse; for example, in discussing the marital deduction in community property states, the following sentence appears: "First, a community-property adjustment under Section 2056(c)(1)(c) reduces this figure by the 'excess of the community property' [a figure defined in Section 2056(c)(2)(B)] that must be deducted from 50 percent of the adjusted gross estate, after deducting the excess of the total expenses under Sections 2053 and 2054 over the actual Sections 2053 and 2054 deductions under the rule applicable to 50 percent of the adjusted gross income in separate community-property states."

They immediately give an example of the above and set out a schedule for a calculation. However, they may have already lost their reader. Indeed, much of the book is concerned with stating a rule from a Code Section and then attempting to explain, with use of examples, the Code Section's meaning. It seems doubtful that a lay reader would be interested in the Code Sections or their language except in footnote form for reference.

For an accountant who feels his or her education in estate planning is lacking, this book might well answer a need for a comprehensive, yet basically readable handbook of the many possibilities in estate planning.

But tax laws change and this book deals with the Tax Reform Act of 1976. Congress at this time is considering either a postponement of the effects of parts of the Act or new laws in place of some of the provisions of the Act, specifically in the area of the tax basis to beneficiaries.

Despite minor problems caused by the complexities of the subject matter, the book can be recommended to those interested in learning in more detail about the involved Code Sections that affect estate planning. The likely readers will be lawyers and accountants who will find it necessary to supplement their reading with up-to-date material that points out changes since the publication of this book.

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The Multinational Corporation: Accounting and Social Implications (Urbana, Ill.: Center for International Education and Research in Accounting, Department of Accountancy, University of Illinois, 1977, pp. 234, $6.00).

The 13 papers in this book were presented at the International Seminar sponsored by the Center for International Education and Research in Accounting, University of Illinois, in March, 1977. In his keynote address paper, Hans B. Thorelli emphasizes that multinational corporations (MNCs) and less developed countries (LDCs) can best serve their mutual interests by forming a partnership based on respect and trust. He suggests that MNCs should voluntarily establish audits of managerial performance to be conducted either internally or by outside consultants. This type of audit, according to Thorelli, presents three exciting challenges to the accounting profession. First, economic performance practices must be standardized internationally. Second, quantitative and qualitative measures need to be developed and implemented. Finally, a new type of management information system should be designed to help answer relevant questions.

Borrowing from William Shakespeare's "The Seven Ages of Man," Athol S. Carrington introduced his "Accounting Standards and the Profession—Seven Ages of Development." Presented in a light manner, his seven ages of development—innocence, improvisation, uniformity, inflation, intervention, integration, and innovation—are thought-provoking, especially in terms of Thorelli's challenges to accounting.

Four papers concentrate on an LDC. L. LeVan Hall discusses the home-country influences that

MNCs based in developed countries carry into LDCs. After citing problems in Tanzania, he recommends that the host country evaluate the benefits and costs of each MNC operating within its borders. In addition, he believes the host country should design a control system to ensure that anticipated benefits are achieved and expected costs are not exceeded.

In 1972, Nigeria began the process of transferring partial or complete ownership of business firms operating within its borders from foreigners to Nigerians. Afolabi Soyode discusses this policy and the accounting data that are used to determine the prices of stock sales to Nigerians. Yah Mireku-Mensah presents an informative background of "Accounting Aspects of Economic Development in Ghana." Under a similar title, Naim H. Dahmash discussed "Accounting Aspects of Economic Development Planning in Jordan."

Empirical data relating to risk and the MNC are analyzed in two papers. William R. Folks, Jr., Thomas G. Evans, and Michael Jilling report the results of a questionnaire completed by 107 U.S.-based MNCs regarding management of their foreign exchange risk. Among the topics explored are: objectives of corporate exchange risk management policies, techniques used to achieve these objectives, and the extent these techniques are influenced by conditions in the host country. To look at risk in a broader sense, Haim Falk and Vihang R. Errunza gathered data from 160 corporations. Using 13 accounting ratios, the authors compare relative risk positions and earning performance of MNCs with similarly situated domestic corporations.

Financial reporting problems encountered in international business by MNCs are discussed in three papers. From the perspective of a U.S.-based accounting firm, William R. Mette, Jr., presents an overview of financial reporting differences around the world and the role of the International Accounting Standards Committee. His appendix contains annual reports for companies based in Australia, Denmark, France, and the United Kingdom. From the perspective of a German-based accounting firm, Wolfgang Lück reports on the problems faced by German MNCs that prepare consolidated financial statements. In his paper, "International Accounting Practice and the Reporting of Price-Level Changes," Peter E. M. Standish reviews accounting responses to inflation and price-level changes.

International corporate bribery is the theme of two papers. David F. Linowes rejects the argument that bribery is necessary to do business abroad. Strong emotional feelings against business deceit and dishonesty flow from his paper.

In contrast, Lee H. Radebaugh approaches corporate bribery of foreign officials by examining how and why such activities occur and reactions to disclosure by U. S. government agencies and accountants. His conclusions are in agreement with those of Linowes—top management should consciously establish a corporate climate emphasizing honesty.

International business and accounting researchers, educators, and students will find much useful information in this volume. Some may be disappointed by the lack of empirical papers and rigorous research techniques. However, excellent background information with interesting observations and analyses provide considerable material and ideas for further research.

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ROBERT G. MURDICK, THOMAS C. FULLER, JOEL E. ROSS, and FRANK J. WINNERMARK, *Accounting Information Systems* (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1978, pp. ix, 499, $13.95).

Writing an introductory text in an area as ill-defined as accounting information systems (AIS) presents the author with numerous challenges: what topics should be included? in what order should they be presented? what is the proper depth of coverage? should the focus be technical, behavioral, or organizational? The authors have "attempted to present good basic coverage of a new subject of vital importance to future practicing accountants" (p. ix).

The book's 14 chapters are grouped into five parts. Part I (2 chapters) sketches the variety of management's information needs and discusses the accountant's role in the organization's information and decision systems.

Part II (3 chapters) introduces the basic accounting and operating systems in the firm. For most systems, the description is limited to a summary flowchart. The exception is accounts receivable, for which a detailed description of a particular software package is provided. For the student with no EDP background, this description will be difficult to follow, as it includes computer hardware and file concepts as well as standard system flowcharting symbols not previously introduced in the text. The space could have been better used to provide more thorough descriptions of all systems and to describe the role played by each. Part II also includes a good introductory chapter on internal control and a chapter on the reports produced by the AIS. This latter chapter would be stronger if it more clearly delineated how and why these reports are generated, and by which subsystems of the AIS.

The third part of the book (2 chapters) provides a broad overview of the problem finding and problem solving processes. A great deal of material is introduced in a very interesting discussion of this area. The section concludes with a brief look at the impact of the AIS on some key corporate decisions.

Part IV (5 chapters) provides a glimpse of some aspects of the system development and implementation processes. The major steps in the development process are described briefly. One chapter describes a number of tools and techniques useful for systems analysis and design. The discussion in this chapter focuses on the mechanics of each technique, but there is little integrating material to explain why the techniques are useful or how they fit together in the overall design process. The remaining chapters focus on forms design and control (less of the former, more of the latter), and the hardware, software, and database components of the AIS. Coverage of each of these areas is brief, and centers more on what than on why.

The final part of the book (two chapters) introduces the topics of maintaining, controlling, evaluating, and auditing AIS.

Throughout the book, there are numerous charts and illustrations to supplement the text. In addition, each chapter is followed by a short bibliography and by a list of discussion questions and problems. As most topics are given only a brief, introductory treatment in the text, longer bibliographies which could lead the interested student to a more thorough coverage of the topic would be desirable and would add to the usefulness of the book as an introduction to AIS.

In conclusion, the breadth of topics covered provides a more than adequate view of the scope of the subject. However, few topics are discussed in enough detail to provide the interested student with a clear understanding of how that topic fits into the broader picture of AIS. The authors state that this book "is an accounting text which is designed for the accountant in a completely different role from that of the past" (p. ix). There are, however, four new roles which the accountant might play: a designer of computer-based information systems, a user of computer-based information systems, a manager of the development and operation of computer-based information systems, or an auditor of computer-based information systems. The authors never clarify which of these roles they are concerned with, and the material they present attempts to address all four. Unfortunately, a single, 500-page text book cannot provide an adequate introduction to the topics relevant to each of these roles.

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ALAN L. PATZ and ALAN J. ROWE, *Management Control and Decision Systems* (Santa Barbara: John Wiley & Sons, Inc., 1977, pp. xii, 453, $13.95).

This book of text, readings, and cases is a broadly based examination of the motivational, technical, and political aspects of management decision systems. The authors adopt an integrative, socio-technical approach to exploring the question of how managers can exercise control and make decisions to achieve organizational objectives.

As a text, this book probably will be most appropriate for management, organizational behavior, or behaviorally oriented decision science courses. However, the book also could be used as a supplement in an advanced managerial accounting or conceptual information systems course where some emphasis is placed on the behavioral and organizational dimensions of management decision and control systems. Outside the classroom, the book constitutes a nicely organized collection of readings for those with research interests in this area.

The book is organized into five chapters. Each chapter is introduced with a brief discussion of key concepts which serves as a framework for the three readings and one case which follow. The readings are preceded by a brief synopsis, and discussion questions are provided for the readings and the cases.

The underlying theme of the book is that the complexity of interactions between human behavior and control decisions in the technical, socio-technical, and social organizational settings necessitates an integrative approach to management decision systems. This systems approach "considers management decision making as part of a social process in which human behavior interacts with an organization's information and technical procedures, as well as the economic and political realities that exist in the organization."

This theme is further developed by the introduction of the concepts of Dynamic Strategies, Adaptive Controls, and Goal Effectiveness as a foundation for more effective management decision systems. Three chapters are concerned with the motivational, technical, and political bases for behavioral and control decisions, respectively. The authors' decision systems approach undertakes to integrate these three interrelated dimensions of management decision making.

Approximately two-thirds of the book is devoted to the readings. The 15 selections are taken primarily from the management, decision science, and organizational behavior literature. The oldest paper originally appeared in 1967, but most of the papers are dated in the mid 1970s.

The readings are well chosen in relation to one another and to chapter objectives. Most of the readings present empirical research findings related to chapter topics. The reported research studies are quite diverse in level of sophistication and methodology. As a result, selected papers could be used at different levels for readers with varying backgrounds and interests.

The authors' comments introducing each chapter are quite brief (52 pages total). The comments are terse and are effective in creating a conceptual framework for the readings. However, the reader with limited exposure to the literature and vocabulary of the area may require some supplement or assistance to fully appreciate the authors' implications.

The five cases vary in length from six to 29 pages. The organizational contexts depicted in the cases are quite diverse, including a hospital and a university as well as corporate enterprises. Most of the cases include rather rich background information as a basis for discussing systems-wide issues and alternatives. The strategy of using this type of case appears to be well suited to the objectives of the book.

In conclusion, this book primarily is a well-conceived, well-organized collection of readings related to the behavioral and organizational aspects of management decision making. The text portion of the book is effective, but may be excessively terse to function as a complete textbook, depending upon the level and objective of the course. The book may be particularly valuable as a supplementary readings text and as a resource book outside of the classroom.

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WILLIAM W. PYLE, JOHN ARCH WHITE, and KERMIT D. LARSON, *Fundamental Accounting Principles*, Eighth Edition (Homewood, Illinois: R. D. Irwin Publishing Company, 1978; pp. XVII, 946, $14.95).

This edition, as with previous editions, is designed for a one-year course in financial and managerial accounting at the undergraduate level. However, along with the addition of Kermit Larson as a co-author, have come a number of significant changes which have greatly improved the text's pedagogical effectiveness.

The stated objective is to serve "the educational needs of both students who will make accountancy their career and those who will use accounting information in other areas of specialty or in personal affairs" (p. VII). To fulfill this objective, the general emphasis of the text is three-fold, consisting of: (1) a description of fundamental concepts and principles underlying accounting information; (2) an explanation of how accounting data are accumulated; and, (3) an integration of the effective use of such data.

The topical outline has eight major parts. Part I (Chapter 1) has changed from the previous edition; all material on accounting principles (formerly in Chapter 14) has been incorporated into this chapter. Part II (Chapter 2-6) has not changed materially, placing the major emphasis on the basic accounting cycle for service and merchandising businesses. Parts III (Chapters 7-11) and IV (Chapters 12-14) present a basic treatment of the balance sheet accounts. Although the content is similar to the previous editions, the rearrangement of topical coverage represents a more understandable logical flow for discussion purposes. Part V (Chapters 15-17) presents the traditional coverage of the corporate form of organization, again with some minor rearrangement of topics discussed. Part VI (Chapters 18-20) contains the chapters on the statement of changes in financial position (Chapter 18) and analysis of financial statements (Chapter 19), which are similar to the Seventh Edition. However, Chapter 20 is entirely new material on price-level changes and represents a substantial positive change. Parts VII (Chapters 21-23) and VIII (Chapters 24-28) are specifically related to managerial accounting. Flexible budgeting has been added (Chapter 26), and the previous coverage of fixed budgets has been revised to emphasize the preparation of master budgets for several sequential periods.

A basic accounting text cannot be rated very high unless it contains excellent homework and demonstration problems to reinforce its major points. The authors have done an admirable job in providing an adequate quantity of well-coordinated material for each chapter. To assist the student, each chapter is begun with a set of measurable objectives designed to focus attention on important topics and upon expected student performance. A glossary of important terms has also been added at the end of each chapter, as well as an excellent set of questions, exercises, regular problems, alternate problems, and decision problems. All of the problems have been rewritten.

Evaluation of a text should also include a review of supplementary support materials accompanying the text. Materials in this area are even more extensive than for the previous edition. A workbook of study guides, two booklets of working papers, three practice sets, and a list of check figures are available to students. Instructors may obtain a series of ten achievement tests, which includes two final examinations, a booklet of supplementary test questions and short-answer problems, and transparency solutions to each problem in the text, plus 35 additional teaching transparencies to be used as aids in classroom presentations.

The conclusion that can be drawn is that the book primarily is aimed at the segment of the textbook market which prefers the use of a single textbook for a traditional two-course principles sequence emphasizing financial accounting, but still providing adequate coverage (eight chapters out of 28) of managerial topics. All of the material has been updated where appropriate, including incorporation of the most recent pronouncements of authoritative bodies such as the Financial Accounting Standards Board, Securities and Exchange Commission, and Internal Revenue Service. The new edition is approximately 100 pages longer, largely because of the inclusion of accounting for price-level changes and flexible budgeting. Some of the more procedural subjects have been condensed. Overall, the authors have done a creditable job of achieving the stated objective of the text. Adopters should be highly pleased if the text is used for a course which fits the traditional mold.

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WILLIAM L. RABY, *The Income Tax and Business Decisions: An Introductory Tax Text*, Fourth Edition (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1978, pp. 525, $16.95).

The book emphasizes the tax impact on the decision-making process. As such, it has much practicality in an MBA course for acquainting the student with an important criterion in any business decision.

The underlying philosophy is to convey a meaningful understanding of taxes rather than to present a repository of tax rules. In explaining today's tax laws, Raby discusses the historical origins of many tax provisions, emphasizing the social, economic, and political influences. Another technique employed is to compare and contrast financial accounting rules with tax accounting rules, including installment sales, depreciation, leases, investment tax credit, and the LIFO method of valuing inventory. Before getting involved in the substantive subject areas, the author introduces the basic characteristics of each type of taxpayer, explaining the tax planning opportunities unique to each. In the delineation of the various taxpayers, the major tax forms used by these taxpayers, and the consequent tax differences are compared and contrasted.

After introducing the various tax entities, many of the more important substantive areas which affect business decisions are presented. The importance of the tax laws for such decisions as dividends, pricing, business form, capital budgeting, and replace-or-repair are developed. The effect of the tax rules on these decisions is demonstrated in the context of hypothetical cases which simulate the "real world." In many cases, cash flow is emphasized.

The book is organized so that related rules associated with a particular kind of a decision are dealt with in a logical sequence. For example, depreciation recapture is discussed along with depreciation. The depreciation method impacts both on the cash flow of a business and on the subsequent disposition of the asset. The intertwining of the minimum and maximum tax is developed to indicate the relationship between these two provisions of the Internal Revenue Code. In a separate chapter, the effect of the tax laws on the investor is pointed out by analyzing the tax strategies peculiar to each type of investment. In the final portion concentrating on tax practice and policy, the author discusses such topics as handling an audit, tax fraud, tax research, and planning and tax reform.

An interesting feature is the last section of each chapter entitled "Case Excerpts." The cases have been edited to avoid the entanglement inherent in interpreting judicial prose. The "Case

Excerpts" indicates to students that much of what is referred to as the "tax laws" emanates from the judicial arena. In addition, it provides a "beginner's lesson" on the intrepretation of the case material.

In summary, this book focuses on the federal income tax as a component in the decision-making process. It is easy to comprehend, making it an excellent selection for a general course in taxation.

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DONALD M. ROBERTS, *Statistical Auditing* (New York: American Institute of Certified Public Accountants, 1978, pp. xii, 274).

The origin of this book is unique. It is authored by a professional statistician who has had considerable consulting experience in audit sampling. It has been reviewed at various stages of completion by about 25 professional auditors (members of the Statistical Sampling Subcommittee of the AICPA) who have had considerable experience in field application of audit sampling, and it is published by the national organization of practicing certified public accountants. The first factor assures an awareness of specific auditing problems as well as technical statistical validity, while the second provides a practical validity often lacking in quantitative work in accounting. Finally, the third factor indicates the importance of the subject matter for current practice.

The purpose of the book is to "help the auditor use statistical sampling in audit practice." The "help" is primarily in the form of providing a rather specific basis for the application of statistical sampling techniques which have been successfully applied in practice. The approach is entirely consistent with existing professional standards expressed in section 320 and appendices 320A and 320B of *Statement on Auditing Standards #1*. The book provides a much-needed clarification and illustration of how the concepts expressed in auditing standards might be applied, along with specific statistical techniques which might be advantageously used.

The book is not a primer in statistics nor is it a complete statement of how statistics might or should be applied by auditors. For example, it does not consider the statistical aspects of internal control system design evaluation, statistical analytical review, Bayesian methods, or traditional methods not widely used in practice such as cluster and multistage sampling. It does, however, provide much practical guidance in selecting auditing techniques which have wide applicability and can be expected to control audit sampling risk at reasonable cost.

The book can be divided into three basic parts. The first (Chapters 1, 2 and 3), reviews current auditing standards related to evidence and testing, and introduces basic statistical concepts which are relevant. The focus is on the appropriate integration of auditing and statistics to yield effective and efficient auditing. Topics covered which have received little or no attention in the previous AICPA literature and other books on audit sampling include: the risk of over-auditing, the risk of unwarranted reliance on internal control, nonsampling error, and the use of multiple audit tests. Furthermore, the positive and negative approaches to substantive tests of details which are implicit in section 320 are clarified.

The second part of the book (Chapters 4, 5 and 6) discusses various statistical techniques which have been successfully and widely applied in audit practice. Considerable attention is devoted to how the peculiar nature of accounting populations and the nature of auditor decisions affects the application of well-known statistical procedures. The presentation of relevant techniques includes the assumptions and rationale underlying each technique, the advantages and limitations of each under various situations, and relevant trade-offs. Audit planning and implementation decisions are shown as being based upon what the auditor expects to find in a given application. Specific consideration of appropriate alternatives when expectations are not met should be particularly helpful to practitioners. Also of value is the liberal insertion of practical guidelines as to what large (small), many (few), high (low), *etc.*, mean in terms of specific numbers in statistical auditing. Finally, references to underlying theoretical and empirical work in the accounting and statistical literature are provided for those wishing to extend their knowledge.

Chapter 4 covers attribute methods, while Chapters 5 and 6 cover variables methods. Of particular interest in the variables chapters is attention to methods based on selection with probability proportional to size. For applications in which few errors are expected, the Stringer bound is discussed; and for applications expected to yield many errors, the probability-proportional-to-size ratio evaluation method is presented.

The third part of the book concerns field application of the topics discussed in the first two sections. Chapter 7 presents "one possible way to integrate statistical sampling into the audit planning process." The rather comprehensive integration is consistent with SAS #1. However, many auditors may find other, perhaps less completely integrated methods to be more appropriate, given the present state of knowledge. Chapter 8 presents a case study of accounts receivables and sales to illustrate the integration of Chapter 7.

Chapter 9 presents descriptions of and sample output from the computer programs available to conduct the procedures presented in Chapters 4, 5 and 6. The programs can be obtained at nominal charge from the AICPA and might be used by practicing CPAs as well as by colleges and universities. The potential user is relieved of the computational and/or programming deterent to the use of appropriate and efficient statistical methods. Chapter 10 presents some policy considerations and quality control suggestions for field application of statistical sampling. Finally, the seven appendices include a rather comprehensive glossary, formulas, tables, and some derivations.

The book has several excellent uses by practitioners, scholars in accounting and statistics, and students of accounting. For practitioners, it can serve as a guide to thinking about risk control and alternative means for achieving it, background reading for training materials on sampling, and as a reference work for audit manuals. The programs can be used as a software package or to supplement packages already in use. For scholars, the book can provide a concise introduction to the peculiar problems of accounting populations and audit decisions. Such an introduction can guide scholars in adapting and developing methods for solving statistical auditing problems. Finally, students can use the book as an introduction to statistical auditing and as background for the current research literature in audit sampling. The computer programs can be readily used by students and are in many ways pedagogically superior to the use of the software packages available for educational use from audit firms.

In summary, the Roberts book provides a significant addition to the literature in statistical sampling in auditing.

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G. D. ROY, *Anatomy of Depreciation* (Calcutta; The World Press Private Limited, 1977, pp. xii, 206, $10.00).

This "exercise" on depreciation mainly follows the old tradition of interpreting "what" is measured. The author seeks to identify depreciation in a number of ways, while trying not to ignore the measurement aspects. At least a basis has been established through algebraic and other processes by which further research may be taken up by others. An attempt has been made to develop the annuity formula for measuring periodical depreciation into a valuation formula, without impairing the utility of the traditional formulas. The author also injects a "novel" idea of human depreciation in order to consider current labor costs as amortized capital expenditure so that the replacement of a machine by labor, and *vice-versa*, may be brought into consideration.

The book opens with traditional methods of depreciation, by charging depreciation as an expense to revenue. However, the process is found to yield simultaneously an equivalent fund in case profit is not inadequate. This inadvertent appearance of a fund possibly could prompt accountants to treat depreciation as a "provision." As such, an attempt is made to reconcile "provision" with "expense," and it is concluded that the former, if adopted as a method of depreciation, might serve the purpose of both. Though depreciation essentially could be considered as an "expense," it could be recognized as "diminution of value." The idea, however, should be based on what may be the difference of two values. Since much controversy has been raised in the past as to the nature of the said value, interpretations such as "diminution of life" and "recovery of capital-outlay" are introduced. As such, depreciation rates are proposed to be studied under three categories: (1) allocation of cost resulting from expiration of cost, (2) recovery of capital-outlay, and (3) revaluation. Although the three methods are accompanied by yielding of funds, the special emphasis is accorded to the "recovery of capital-outlay."

The various conventional methods of allocating expired deferred cost are discussed, and special emphasis is placed on the diminishing balance method aiming at equalizing the periodical cost of depreciation plus repairs and renewals, the latter being expected gradually to rise towards the later periods of the life of the asset. Roy claims, however, that that seems to be hardly possible because the value of *r*, which is the rate of initial charge, depends, instead of on repairs and renewals, actually on n, the life of the asset, and on R, the rate of total depreciation, in accordance with the following equation:

$$r = \left(1 - \sqrt[n]{1 - \frac{R}{100}}\right) \times 100$$

The measures of depreciation charges obtained under the method are decreasingly accelerated, and the said acceleration is not uniform. The author, therefore, suggests an alternative method of uniform acceleration. The alternative method deals with "capital-outlay" and links itself with the sinking-fund method and the annuity method, which are naturally related with the computation of interest. Algebraic formulas are established, in case of both the methods, in order to show the relation with the asset cost and to find out the measure of the depreciation charge of a given period. The idea of cost of capital is formulated with the annuity method and the computation of interest. The annuity method, also, fosters the growth of an asset valuation method. For internal investment of depreciation provisions, the "current cost method" cannot be a substitute for the "replacement cost method" by making any kind of manipulation of the investment.

No attempt seems to have been made to assert anything abruptly at any given stage of the book. Yet no last word has been spoken regarding a final conclusion where depreciability is identified as the unpredictability of the asset life. Such a conclusion, Roy claims, deprives "time-assets" such as leaseholds, intangibles, *etc.* of depreciability and makes "use-assets" entitled to it only as a special kind of amortization. Further consideration may be given to the problem, as opposed to a situation, in which "use" is itself a function of "time." The book provides an excellent basis for further rigorous research.

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HAROLD F. RUSSELL, *Foozles and Frauds* (Altamonte Springs, Florida: The Institute of Internal Auditors, Inc., 1977, pp. xv, 249, $16.00).

The result of a research project, the stated purposes of the book are five, but it is primarily oriented toward putting fraud into perspective for the internal auditor. The book draws on the author's 40 years of internal audit experience as well as opinions and experiences contributed by more than 100 members of the Institute of Internal Auditors.

The book includes 28 chapters organized into eight parts. Part 1 includes two chapters, the first representing an attempt to define and explain the interaction of foozles and frauds, and the second chapter identifying and elaborating on the objectives listed above. In explaining the book's title, the author quotes a dictionary defining a *foozle* as "an awkward, unskillful act; a bungle," and fraud as "intentional deception to cause a person to give up property or some lawful right" (p. 2). Highlighting "intention to deceive" as the critical distinction, Russell makes the point that many frauds are perpetrated to cover up foozles made by the perpetrators.

Part 2 includes eight chapters, the purpose of which is "to supply ancillary memorandums to audit programs" to enhance the auditor's vigilance and sharpen his perception of conditions that command attention. The first of these chapters sets forth some general caveats concerning such matters as overreliance on internal controls and overemphasis on the notion that the auditor does not and cannot conduct his examination by presuming that fraud exists. Four chapters contain primarily a series of anecdotes about frauds related to assets, liabilities, income, and expenditures, respectively. Three chapters contain additional anecdotes concerning such selected topics as foreign currency exchange, adequacy of footnotes, price-fixing, credit-card frauds, bribery, and kickbacks, among others. Computer frauds are treated lightly, with just over two pages on this subject. These cases are generally very brief and not unlike those found in other compendiums of fraud cases. They do serve to remind the auditor of, or open his mind to, the myriad possibilities for fraud.

Part 3 includes seven chapters dealing with the investigative audit of suspected fraud. The discussion includes approaches to interviewing suspects and other means of gathering evidence, including polygraph systems. Appropriate cautionary measures are suggested for auditors investigating fraud to avoid risks associated with defamation, false arrest and imprisonment, surreptitious recordings, and securing confessions. A particularly noteworthy aspect of the section is the coverage given to human behavioral considerations aimed at obtaining the maximum cooperation of all parties involved, including the suspected perpetrator. This section also includes a chapter on internal auditors' views on their responsibility for investigating various types of fraud and a chapter on fidelity bonds and preparation of claims thereunder.

Fraud and the criminal law is the subject of Part 4. The first of the two chapters in this part provides legal definitions distinguishing the various types of fraud crimes and describing certain illegal business practices. Cursory reviews are provided of the applicability of the antifraud sections of the Securities Act of 1933 and the Securities Exchange Act of 1934, as well as Section 7201 of the Internal Revenue Code of 1954. In the second chapter, Russell examines the question of when to prosecute.

The two chapters in Part 5 provide advice to top managements and internal auditors with regard to adopting policies and measures for establishing and observing ethical principles and investigating and reporting on suspected infractions. Three exhibits provide actual examples of one firm's written policy on ethical principles and legal standards and two firms' administrative procedures for handling and reporting illegal acts. These exhibits predate enactment of the Foreign Corrupt Practices Act of 1977 and are not models for complying with that act, although readers may find them of interest in connection with setting up an apparatus for complying with the act. Coordination between internal and external auditors and the case for independent audit committees of the board of directors are also discussed in this section.

In Part 6, Russell states eight general conclusions for the internal auditor, supported to varying degrees in the earlier chapters. Peculiarly, from an organizational standpoint, a second chapter in this part, labeled conclusions, introduces new material on technical investigative aids. The chapter concludes with a plea for top management to assume additional responsibility for better defining the auditor's proper role in the detection of fraud, and a plea for others to develop additional case studies and conduct additional surveys on the subject of fraud.

After a slow start in the introductory chapter of Part 7, the next two chapters provide a lively review of landmark fraud cases. All the well-known cases are reviewed. Unfortunately, the coverage is not well-balanced. For example, the story of Ivar Krueger runs on for more than ten pages, longer than 20 of the 28 chapters in the book.

In the remaining two chapters of Part 7, Russell conveys the Sutherland school's theories on criminality, reviews a number of other studies in the accounting and business literature on fraud, and compiles another collection of fraud cases seemingly left over from earlier chapters. Finally, Part 8, comprising one chapter, lists 15 points stressed in the book with yet more brief anecdotes thrown in.

This modestly long (249 pages) book suffers from a crisp but choppy writing style, as evidenced by seven chapters which are three pages or less in length. A typical page includes seven or eight short paragraphs. Another deficiency of the book is its failure to address the implications of the Foreign Corrupt Practices Act of 1977 and SAS 15 and 16 on the independent auditors' responsibility for detecting errors, irregularities, and illegal acts. In fairness to the author, the book likely went to press prior to their issuance or implementation.

Notwithstanding the above criticisms, the style of the book may encourage broader readership among its intended audience, internal auditors, and thereby contribute to meeting the objectives identified at the outset of this review. Furthermore, the human behavioral considerations discussed, though briefly, in Part 3 on the investigative audit might be of interest to students and external auditors in view of the underemphasis on that topic in the auditing literature.

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EDITOR'S NOTE: This book was previously reviewed in "Capsule Commentaries," January 1979 issue.

CLARENCE SCHEPS and E. E. DAVIDSON, *Accounting for Colleges and Universities*, Third Edition (Baton Rouge, Louisiana: Louisiana State University Press, 1978, pp. xv, 379, $24.95).

The new edition of this authoritative book provides a current sourcebook, reflecting the changes since the early 1970s in college and university accounting brought about by the publication in 1973 of the American Institute of Certified Public Accountants' industry guide, *Audits of Colleges and Universities*; the publication in 1974 by the American Council on Education of the revised *College and University Business Administration*, and the work in recent years of the National Center for Higher Education Management Systems in the areas of cost analysis and account classification.

The first edition, published in 1949, set the general format and subject matter of all three editions. The second edition, published in 1970, added a chapter on Data Processing Systems. The new edition uniformly follows the second edition in its general format and contents.

Between the publication of the first and second editions, colleges and universities experienced an unparalleled growth. Student enrollment increased markedly and support for research and graduate training from the Federal government, foundations, corporations, and other sources increased to an even greater extent. By the end of the 1960s, the expenditures of individual colleges and universities were exceeding one hundred million dollars annually. Endowment, student loan, and other non-expendable funds of individual institutions often amounted to $100 million or more. And the outstanding debt of individual institutions for residence halls, student centers, and recreational and other facilities often amounted to $50 million dollars. The size of such fiscal data and the number of colleges and universities involved commanded attention from federal and state governments, lenders of funds, donors, the public accounting profession, and interested alumni. All of these groups became interested in the accounting principles followed in college and university financial reports, the contents of these reports, and the certification of these reports by public accountants.

In 1968, the American Council on Education published a revision of the 1952 College and University Business Administration manual, reflecting this widespread interest in the business and financial policies and practices of educational institutions. Soon thereafter, in 1970, Scheps and Davidson prepared a revised edition of Scheps's 1949 book, which carefully incorporated the contents of the American Council's manual which had reference to specific accounting matters and included a number of new developments arising in the 1950s and 1960s.

As the authors point out in the preface, the third edition of their book incorporates, within their standard format used in the earlier editions, the concepts, definitions, terminology, techniques, and financial reporting procedures of the AICPA Audit Guide and the American Council's Business Administration Manual.

While the major objective of the authors for this 1978 edition is accomplished (to reflect in their standard format and coverage the industry Audit Guide and Business Administration Manual), it could have included other developments of interest to those who are currently involved in college and university accounting matters.

Since 1970, there have been several developments in the area of internal control and internal audit which one would expect to be noted in a 1978 edition. The organizational reporting of the Internal Auditor is now not quite as precise as formerly, and the coordination of internal and external audits is now a significant part of the whole audit process, yet there is no mention of either of these current developments. And the statement, "the use of the computer as a tool of internal auditing is still being explored," seems a little out of date for 1978.

All three editions of the book have included a chapter on Development, Organization, and Personnel of the Business Office, with very little change in the contents of the chapter. Yet, since 1949, there has been considerable discussion concerning the structure of the main Business or Financial Office, the concurrent development of centralized fiscal controls and decentralized operating practices, the impact of government actions and labor union developments on personnel policies and procedures, and other matters with a major influence on the structure and responsibilities of the senior executive officers of a college or university. While the subject matter of this chapter is not crucial to a book on accounting, if the chapter is to be included, one would expect that some recognition would be given to the developments in this area since 1949 and 1970.

The shortcomings in this book, however, do not detract materially from the main objective, to present an up-to-date, authoritative sourcebook on current accounting policies and practices for colleges and universities. As such, the book is a very good current source of information for college and university fiscal managers, for accounting teachers who would like to include in an accounting course some attention to a large area of not-for-profit accounting and fiscal management, and to anyone in the general public interested in a readable, pragmatic presentation on accounting in colleges and universities.

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MICHAEL SCHIFF, *Accounting Reporting Problems—Interim Financial Statements* (New York: Financial Executives Research Foundation, 1978, pp. 139).

This empirical research effort is directed toward examining and evaluating current practices in interim reporting under Accounting Principles Board (APB) Opinion 28. Two groups were identified by the author as having a potential interest in the research findings: financial executives who prepare interim statements and the Financial Accounting Standards Board, which is studying the problems of accounting for interim periods. The study, by design, was restricted to accounting measurement problems for interim periods and does not address the issues of disclosure or auditor involvement.

The research design involved the following steps: 1. a literature review; 2. interviews with financial executives, CPAs, and financial analysts; 3. the development and testing of a questionnaire; 4. original and follow-up mailing of a revised questionnaire; and 5. tabulation of the results and preparation of the report.

The brief review of the literature was conducted to focus on two matters: empirical research which confirms that interim reports are useful to investors, and accounting and reporting problems which have surfaced subsequent to the issuance of APB Opinion 28. Since the Opinion lacks specificity in explicating the accounting principles to be followed, diversity exists in accounting practices.

Interviews were conducted with a small number of financial executives, CPAs, and security analysts to identify problem areas to be addressed by a questionnaire. The questionnaire was field-tested, revised, and then mailed to 1,000 randomly selected members of the Financial Executives Institute; 268 usable responses were received.

The first part of the questionnaire sought to identify accounting practices currently employed for revenue recognition, treatment of the adjustment for invasion of LIFO base stock during interim periods, treatment of manufacturing standard cost variances, allocation of other costs and expenses, disposal of a business segment, foreign currency translation, and valuation of marketable securities. The second part of the questionnaire asked for opinions on determination of effective income tax rates, accounting for manufacturing cost variances, allocation of costs and expenses, determination of the effective tax rate for clearly identified seasonal businesses, and criteria for an overall approach to interim reporting and relative costs of implementing adherence to the selected criterion.

Among respondents to the questionnaire, widespread acceptance of end-of-year principles for interim periods exists. However, the author concludes that the vagueness of APB Opinion 28 and its vacillating position on accounting for cost and expenses is responsible for respondents indicating the utilization of methods which would be supportive of both the *discrete* and the *integral* concepts of income measurement. A majority of respondents favored the *integral* concept, but in choosing among alternative accounting methods, respondents favored methods which could support both the *integral* and the *discrete* concepts. Despite the availability of alternative accounting practices with regard to income determination, respondents favored anti-smoothing practices even though the smoothing option was available.

Drawing upon his knowledge of interim reporting practices and problems, the author provides a concluding recommendation to the FASB. Since a modified set of standards would need to be extensive to cover the many issues and variations encountered in interim reporting and the need for its articulation with the conceptual framework, a modest proposal for accounting policymakers is advanced:

> Companies should prepare interim reports applying standards on a consistent basis. Accounting principles utilized must be articulated as they currently are in annual reports. Relevant accounting changes must be reported in the interim period.

The greatest limitation of the study is the potential nonresponse bias which always exists in such a study. To the extent that the sample is representative of all companies (and some concern is expressed about this through an analysis of the respondents), the study is most informative about accounting methods employed in accounting practice and opinions of financial executives about interim accounting problems. In fact, the study provides the most complete survey of methods utilized in measuring interim income that has been published to date.

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ALLEN H. SEED, III, *Inflation: Its Impact on Financial Reporting and Decision Making* (New York: Financial Executives Research Foundation, 1978, pp. xvi, 137, $3.00).

It is refreshing to read a research study that is not replete with abstruse language or mathematical symbols, but is well-organized, clearly written, and to the point. The purpose of the study was to search for answers to three basic questions: (1) How does inflation affect both financial reporting and decision-making? (2)

What reporting practices are employed internally and externally in different companies to cope with inflation? and (3) What practices should be adopted in the United States in light of the 4-8 percent expectations for inflation in the next five years (p. xiii)?

The research consisted of interviews with 35 financial executives (preparers) and 25 external users of financial statements between July, 1977 and January, 1978. An assessment of what the preparers and users perceive their needs to be, rather than what the researchers think they ought to be was a central focus of the study. Some might question the researcher's design for not specifying hypotheses with corresponding statistical analyses or utilizing a conceptual framework to judge existing practices. Nevertheless, the study is timely and attempts to identify user needs—a critical issue needed by researchers in formulating behavioral objectives.

The report consists of eight chapters, four appendices, and a synopsis of the research at the beginning. The first two chapters are concerned with the nature of inflation and the major accounting proposals that have been advanced to adjust for it. In fact, Chapters 1 and 2 are excellent summaries of the economist's views (*i.e.*, Hicksian versus Friedmanite) and the alternative accounting proposals for recognizing the effects of inflation. The usual coverages of the pros and cons of historical costs are discussed at length in Chapter 2. This coverage may well have been omitted from the accountant's perspective, but may be of some value for readers not well versed in the accounting literature of inflation. Chapter 3 surveys the international dimensions of inflation and summarizes the different accounting responses that have appeared over the years in various countries.

In Chapter 4, the author examines the various attempts at applying accounting proposals with respect to inflation (*i.e.*, price-level and current-value concepts) and how the nature of the business and the financial characteristics of the company impact on financial statements. An important finding revealed in this chapter is that almost all preparers and users do not feel there is a need for replacement cost information since it is based on the notion of replacing assets that companies will never replace due to technological or financial reasons. And at best it is "no more than a broad, general indicator of the impact of inflation" (p. 46). In fact, similar conclusions were reached for other various forms of price-level and current-value adjustment techniques, even though each may have some theoretical value.

Chapters 5, 6 and 7 focus on the "cornerstone" of the research (p. 59). Chapter 5 describes the methodology, the participants' perception of the rate of inflation in the United States for the next five years, and how inflation affects different companies, such as capital-intensive businesses, insurance companies, energy intensive organizations, and small business, to name a few. Interestingly enough, the findings suggest some of the major casualties of inflation are capital-intensive industry, property and casualty insurance companies, and small businesses seeking capital. At the other extreme, most managers of many manufacturing and service companies perceive a relatively small inflation impact on their companies.

Chapters 6 and 7 focus on the impact of inflation on both internal and external reporting practices, and survey how companies and external parties factor inflation into the decision-making process. The research findings suggest that managers, lenders, and investors generally recognize the reality of inflation, but employ their own judgment to reflect its impact rather than relying on current value or general price level accounting techniques to measure it (p. 69), unless the adjustment technique stems from "accepted historical accounting concepts" (p. 83). For example, since most manufacturing companies utilize some sort of cost system, and since the cost system provides the principal cost information for pricing decisions, inflation is quantitatively incorporated in the pricing process to the extent it is incorporated into the cost accounting system (*i.e.*, up-to-date standards). This, and other examples illustrated by the author, suggest that some of the conceptual accounting proposals being advocated by academicians which do not stem from the historical cost model have no real market (p. 69).

The most significant recommendation is that the accounting and financial community should concentrate on improving the existing historical cost framework, rather than seeking a substitute for it (p. 93). Within the historical accounting context, it is recommended that (1) the funds statement be restructured, (2) historical costs on the income statement be classified by type of cost, (3) holding gains and losses be separated on the income statement, and (4) unaudited supplemental information relating to inflation be included in financial reports. If there is a major criticism of the study, other than that it is descriptive, it is in these recommendations. Although the author indicated the recommendations were "those of the researchers" and believes that the majority of the participants would support the proposed changes, the study does not provide the necessary supporting evidence. But the author did effectively describe how inflation impacts on financial reporting and decision-making.

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JAMES H. SELLERS and J. LARRY HAGLER, *The Academic Accountant: A Profile* (Oxford, MS: The University of Mississippi, School of Business Administration, 1978, pp. vi, 83).

The objective of the study was to provide a complete profile of the typical academic accountant in universities and colleges throughout the United States. The authors felt a need to provide information on this group of accountants who have received little attention in accounting and related literature.

Data used in the study were collected from academic accountants by use of a questionnaire containing 55 questions. Questionnaires were mailed to 1,059 academic members of the American Accounting Association. Academic members of the AAA as listed on the 1975 AAA membership roster were stratified on a geographic basis using zip codes; a sample of every third number was selected. Usable responses totaled 565, a response rate of 53 percent. Data analysis was done on the basis of the frequency of responses to questions and comparisons of various elements. The monograph consists of seven chapters and two appendices.

An extension of the study's central theme presents a discussion on "Women in Accounting Education." Using information compiled from the female respondents to the survey, the authors present a profile of the woman accounting educator. Discussions are presented on the women's general (demographic) and professional characteristics, characteristics of their school affiliation, compensation, and job satisfaction. Comparisons of woman accounting educators with all accounting educators in such areas as professional certification, doctorate degree holders, publications, rank, and compensation are also presented. The major limitation of this area of the study is the small sample size—only 46, or 8 percent of the surveyed academicians were women. Despite the large number of tabulated results (32 tables), this factual study gives few interpretations, as was apparently intended. In addition to presenting the overall responses to the questions, the authors made numerous comparisons of the responses of the survey respondents according to their academic rank and type of institution where employed—state or locally supported schools, private schools, junior colleges, AACSB schools, and non-AACSB schools. This dimension of the study is most beneficial, because it allows the opportunity to draw conclusions and to make comparisons of individual personal situations and university requirements with those of their colleagues of similar rank and institution. However, the survey was conducted in 1975.

The authors accomplished their objective of providing a better understanding of the characteristics, attitudes, and aspirations of academic accountants. In addition, the study provides bases for further research concerning academic accountants.

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EARL A. SPILLER, JR., *Financial Accounting: Basic Concepts*, Third Edition (Homewood, Ill.: Richard D. Irwin, Inc., 1977, pp. xix, 739, $14.50).

Are you looking for a text on financial accounting for MBAs that emphasizes the "why" of accounting and incorporates other disciplines? This edition maintains the same conceptual-analytical approach that was stressed in the first edition. The author interweaves other disciplines—management, marketing, and economics—with accounting concepts in several areas of the text. In explaining the earning criterion, the author states, "Each cash receipt from a particular sale or event represents the reward for a combination of efforts—organizing, purchasing, producing, selling, delivering, collecting, and others" (p. 168).

The aim is to develop in the reader the ability to understand, interpret, and analyze the financial statements of business enterprises. The reader is assumed to be mature, intelligent, and motivated to the point that the pace, language, and the intense theoretical discussions of accounting can be handled. Similar to the other editions, this edition is written for a one-semester course offered to students at the MBA or advanced undergraduate level. This edition may be used in management development and training programs.

There is an expansion on the theoretical and environmental framework of accounting in the first chapter. Assets and equities, collecting financial information, elements of the accounting cycle, and accounting concepts of income are discussed in the remaining chapters of the first section. Processing accounting data, internal control, and EDP have been condensed and incorporated in an appendix. A half-page graphic framework for accounting principles gives the "big picture" of accounting which encompasses the assumptions upon which accounting standards, principles, practices, and procedures are built. Also shown are the influences of the overall objectives of accounting, the user characteristics, qualitative guidelines, modifying conventions, as well as reporting standards. The author also uses diagrams to explain accruals, a computer processing system, and a billing function of a company. Some "T" accounts are used to explain the flow of costs, even though the emphasis is on "why" rather than the "how" of accounting.

A chapter on accounting for revenues and receivables has been changed to include franchise and real estate sales revenue recognition. The cost measurements in manufacturing—overhead application, job order costing, and process costing—are discussed in an appendix rather than being presented in two separate chapters as in previous editions. The chapter on inventories stresses the division of the inventory cost between goods sold and the ending inventory, and the effect of this division on the income statement and balance sheet. A chapter on noncurrent assets expresses the major concepts of periodic use, disposition, and expenditures for modifications.

This edition presents leases and pensions in separate chapters. The basic principles for leases and pensions are reported and the complexity of these areas noted. But with the mastery of basic principles, students apparently will be able to understand future developments in leases and pensions.

A chapter on accounting for intercompany ownership and combination has been reordered as to subject—purchase-pooling, consolidations, and the equity method. A new chapter has been added to discuss the problems in financial statement disclosure. One chapter pulls together in one place some important classification and disclosure topics associated with financial statements—unusual changes in income or retained earnings, earnings per share, segment reporting, interim reporting, and foreign exchange adjustments. The statement of changes in financial position and the analysis of financial statements are presented near the end of the book. The final chapter has been revised and expanded presenting alternative income concepts.

This excellent book accomplishes its primary purpose of developing the readers' ability to understand, interpret, and analyze financial statements. Its content, readability, interesting presentation, and interfacing with other disciplines makes the book beneficial to financial- and management-oriented students.

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SHYAM SUNDER, *Oil Industry Profits* (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1977, pp. 74, $2.75).

The oil industry earned record profits in 1973. Critics of the industry held that the oil industry engineered the 1973-1974 oil crisis to aid in earning these profits. Supporters of the industry defended the profits as not abnormally high and necessary if the demand for oil was to be met in the future. This book studies this controversy as it examines the profitability of the oil industry from 1961 to 1975, using accounting reports and stock performance data.

The book has three major sections and a conclusion. The introductory section is well-constructed. It provides a good overview of the general families of problems faced when analyzing industry profits such as making operational the measurement of return. The section is not technical and retains a simplicity so that any reader can understand the problems of such research.

The second section contains an annual and a summary accounting profitability analysis for various three- and four-digit SIC code sectors of the oil industry. The several ratios in the analysis include the return-on-book common equity, return on owners' equity, return on employed capital, return on total assets, and net and gross margin on sales. As an acknowledgment of opportunity cost concepts, the author also includes the return on market common equity. The section is also a primer on the broad problems of using accounting data in financial analysis, as it discusses such difficulties as differential business risk and financial risk, the meaning of book value in the presence of capital markets, and the use of alternative generally accepted accounting principles within the industry at any one time and across time.

Section three considers industry profits from the standpoint of investors' returns based on market values alone. This section requires additional sophistication on the part of the reader. However, those with a basic understanding of the capital asset pricing model will find it useful, as the author uses the model to compensate for risk differentials. He also repeats the analysis using adjustments to compensate for instability in these risk differentials.

The author concludes that "the analysis of accounting variables supports the view that the profitability of the oil business has been no better than the profitability of other industrial firms during the past fifteen years", but that the "risk adjusted profitability of the industry has been better than the average performance of the firms listed on the New York Stock Exchange." However, he adds that the "high volatility of the abnormal stock returns prevents us from placing too much confidence on the positive sign of [the] abnormal returns" (p. 70).

The book is a well-constructed and careful analysis of the profits of the oil industry, making use of the typical data sources and tools available to accounting and financial researchers today. However, the reader must answer the question of whether the data and the tools are truly powerful enough to resolve the question of (ab)normal oil industry profits.

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WILLIAM E. THOMAS, Editor, *Readings in Cost Accounting, Budgeting, and Control*, Fifth Edition (Cincinnati: South-Western Publishing Company, 1978, pp. 538, $7.50).

One can note the shifting kaleidoscope of areas of interest to managerial accountants, as viewed through the five editions of this book. Many of the classical works are still there in the fifth edition, but the occasional disappearance of a familiar favorite is noted with an awareness of the swift passage of time.

The objectives of the book have not changed. The book is still intended to provide a "coherent presentation of the managerial control function." Selections are made with a view toward supplementing current textbooks by providing an easily accessible assemblage of relevant periodical literature to the student. In these purposes, the book is a continuing success. It achieves a balance of old and new material and a coverage of traditional and emerging topics. A wide range of periodicals is represented in these 42 selections. Incidentally, there were over 60 readings in the second and third editions.

There are seven parts, providing some background in management and control, various control topics, and a brief look at one of the purposes of it all—income determination. Part I is titled "Systems for Business Control." A shift in focus is evident in comparing the fifth and fourth editions, even though five of the seven readings continue from the fourth edition. The introduction now emphasizes the term "systems," while the fourth talked of "theory of the firm and the management process." The two new readings are oriented to the goal-process-system (GPS) and control engineering. The five surviving articles emphasize management, systems and responsibility accounting.

Part 2 deals with "Goals and Subgoals," and has been increased from four articles to seven. Three articles survive from the fourth edition, including Caplan's "Behavioral Assumptions of Management Accounting," and Schiff and Lewin's "The Impact of People on Budgets." Management by Objectives (MBO) is the new emphasis, with two added readings on this subject. Part 3, "Decisions," brings three articles forward and adds another article promoting capital budgeting and one promoting zero-base planning.

In Part 4, the reader finds a change in title—from "Models and Techniques" to "Feedforward." This change is heralded by an added reading from 1972, "Managing Through Feedforward Control," by Koontz and Bradspies from *Business Horizons*. Two readings have been added and none dropped from the fourth edition. Some key words from the readings titles are: Corporate Financial Model, PERT/COST, Probabilistic Profit Budgets, Simulating a Cash Budget, Scientific Inventory Management, and Cost-Volume-Profit Analysis.

Part 5, "Feedback for Control," carries forward five articles of classic stature, adding a 1977 newcomer on "Variance Analysis for Pollution Control," and dropping four technique-oriented readings. Some other topics are related to time span, Key-item control, exception reports, behavioral aspects of budgeting, and marketing controls. Part 6 is the most changed section of the book. It consists of four readings, none of which was included previously: two on transfer pricing and two on control through performance measurement—all with 1974-75 publication dates. The heading is "Control of Decentralized Operations," changed from "Systems in Specific Areas of the Business."

It is now a much stronger section than it was in the fourth edition.

Finally, Part 7, "Cost Accounting for Income Determination," continues three of the six former titles and adds two: "The Valuation of Human Resources" and "CASB: An Assessment." The continued articles deal with the matching concept, asset accounting, and overhead allocation.

As one reflects on the scope of the readings, it is evident that a lot has been packed into the space of 538 pages. Other topics come to mind, however, as candidates for such a book. In Part 6, Thomas hints in his introduction of some of the problems of controlling multinational organizations. This reviewer would have welcomed a reading or two in this emerging area, although perhaps good articles on this topic are yet to come. Given the goal of *supplementing* current textbooks, the multinational dimension may not be sufficiently prominent in present texts in accounting, planning, budgeting, and control, to warrant the limited exposure possible through this means. Another topic that might deserve inclusion is the concept of cost/benefit analysis. A limited reference to this topic is made in the zero-base planning article in Part 3. Comparing the second and fifth editions of this book, one notes a gradual movement from articles dealing with techniques in accounting and cost control toward a conceptual and managerial-use-of-cost-information type of orientation.

This readings book seems to lend itself well to courses in cost accounting, accounting systems, managerial accounting, and in budgeting and controls-oriented courses. It can serve as a supplement to a text or case book. It can save the student time in searching for assigned readings. It can be used as a reference source to some extent as a student grapples with a case or problem. The book can easily serve as a basis for a classroom discussion of the ideas and concepts expressed by the many authors represented.

The omission of the excerpts from the Paton and Littleton monograph marks the first time that this has not appeared in the book. Similarly, Howard Greer's "Cost Factors in Price Making" has been dropped. No reference to the subject of direct costing is prominent.

In conclusion, a major drawback of reading books is that they are the product of many subjective determinations by an editor as to what is important literature in the field. Each of us has his own ideas as to the scope of the subject and the best articles that deal with it. A user of a readings book finds compelling reasons to limit the ancillary reading assignments to those in the book, thereby reducing that user's creative approach in the design of the course. The instructor should keep in mind the advantages and limitations of going along with the crowd, and try to be innovative while using the best of available materials, of which this book is one.

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JACK TRAUB, *Accounting and Reporting Practices of Private Foundations: A Critical Evaluation* (New York: Praeger Publishers, 1977, pp. xiv, 222, $19.95).

Private foundations are a largely ignored segment of the not-for-profit area of socio-economic endeavor. Perhaps not enough attention has been devoted to certain institutions which are exerting an increasingly significant effect on our individual and corporate lives. This thought-provoking book reports the results of a survey concerning the status of present accounting practices and the reporting of private foundations' activities to their various user groups. In addition, reporting objectives are attempted and standards that help meet those objectives are described, based on a series of interviews with selected foundation officials and certified public accountants.

The book was based primarily on research undertaken for the author's doctoral dissertation with, apparently, some material added later. The book does suffer some lack of continuity from chapter to chapter.

Although the introduction notes that the emphasis is descriptive rather than judgmental, the author's background as an Internal Revenue Service agent does reveal itself in the form of definite opinions in various discussions. For example, in Chapter 2 on tax abuse by private foundations, the emphasis is very prescriptive in approach. The reviewer, however, was glad to see such prescriptions, while not agreeing with some of them.

The chapter on objectives is extremely brief and consists primarily of describing the users of foundation annual reports. The recommendation is that the reporting objectives should be (1) to inform the reader of the foundation's resources, and (2) to describe the foundation's use of those resources. A summary of authoritative pronouncements examines some of the major accounting alternatives for foundations, including cash versus accrual, depreciation, accounting for grants paid and contributions received, capital gains and losses, and the necessity (or lack thereof) for fund accounting.

A most useful chapter contains the results of an examination of published annual reports of 150 foundations. The accounting practices of foundations in terms of the major accounting alternatives previously mentioned are described and a summary of the types of various financial statements published by the surveyed foundations is included. Based upon Table 5.1 (page 65), a conservative estimate of the assets held by the foundations sampled would be more than $5.5 billion. No information was provided of the extent to which those foundations represented the entire population.

Arguments are included in favor of accrual accounting, the recording of depreciation, accounting for grants when committed instead of when appropriated, treating contributions received as additions to principal, and capital gains and losses being included in the determination of net income. An interesting section on investment policy raises the question as to social responsibility, while other sections discuss the problem of investment valuation and investment performance evaluation.

The recommendations for a set of audited financial statements include an income statement, a balance sheet, and a statement of changes in financial position, all in more or less conventional form. Additionally, another income statement called a "Statement of Financial Activities," which describes the sources of funds and the uses of those funds in terms of activities such as education, science, *etc.* (rather than by natural income or expense categories) is proposed. This type of reporting is usually called Program Reporting. Other reports, particularly applicable to foundations, describe the grant and investment activity.

Even though the measurement of social output is not presently feasible, increased disclosure of grant awards and the results of those grants awarded is recommended. Although corporate social performance is receiving a great deal of attention currently, possibly we have not paid enough attention to the social performance of both our public and private foundations. That seems rather ironic when one considers that, of all our private institutions, foundations more than any other group make a majority of their grants to achieve some social objective.

Traub states that the public would benefit from better accounting practices and reporting standards for private foundations. The proposition is explored that better financial reporting from foundations would help them carry out their own objectives and improve the probability of continued public support. The implications inherent in the increasing role which private foundations are playing in influencing and establishing public policy is not considered. This latter role was evidenced by the 1978 annual conference of the Council on Foundations (the major association of private foundations), where the subjects discussed concerned how foundation initiative is increasing and can become an important factor in the determination of public policy at all levels of public affairs. Such developments may very well generate more interest in the accounting and reporting practices of private foundations.

The historical role of the profession in promulgating accounting standards for private foundations is discussed, as well as a call for the Financial Accounting Standards Board to issue a "Statement of Financial Accounting Standards" on accounting standards and reporting requirements for private foundations. The last chapter includes present statutory and regulatory effects on foundations and their activities. Perhaps this material should have been included in the chapter on tax abuse.

The lack of a summary, either at the end of each chapter or at the end of the book, makes it difficult for the reader to come away with a strong sense of a unified book. Some hard data would also have helped to show the impact that foundations have on our economy. The use of both the first and the third person in presenting author opinion is a bit confusing. Many recommendations appear to be based on Traub's own experience and opinions rather than substantive logical support, as there is a general lack of such support given for many of the recommendations. Such support does sometimes exist but was not always presented in developing the recommendations.

Yet the author's writing style is always most readable and, in spite of these relatively minor criticisms, this book fills a real gap in the literature on not-for-profit organizations. This is an extremely useful book, on the whole, to anyone desiring a good overview of the accounting and reporting practices (and problems) of private foundations.

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George C. Watt, Richard M. Hammer, and Marianne Burge, *Accounting for the Multinational Corporation* (New York: Financial Executives Research Foundation, 1977, pp. viii, 526, $15.00).

The basic objective of the publisher is to sponsor fundamental research and publish authoritative material in the field of business management, with particular emphasis on the principles and practices of financial management. During 1976 and 1977, five such studies were published. With this objective, the book must be regarded as closely akin to financial management.

The impetus for the study is the explosion of American multinational corporations after World War II, which caused a more complex situation with respect to foreign subsidiaries than for domestic ones. This was due to currency exchange rates, different accounting and auditing requirements, and different tax regulations and rates. Despite these differences, authoritative U.S. accounting pronouncements were not revised to reflect such changed conditions.

Three partners of Price Waterhouse & Co. have made this study. The study consists of four parts comprising a total of 35 chapters. Mr. Watt composed Chapters 1 through 24, Mr. Hammer wrote the chapters on taxation, 25 through 35, and Mrs. Burge had a part in the taxation aspects, especially in the tax treaty area.

The book's basic purpose is to present current accounting consolidation practices and recent related changes in tax regulations geared to two groups of readers: (1) financial officers, and (2) members of their staffs who implement the policy decisions of the financial officers. Material which poses policy questions and provides alternative courses of action is designed for the former. Material which is more technical is of interest to the latter. Yet the table of contents does not manifest any definite cleavage of the study into these two categories.

The opening chapter presents a broad overview of the accounting problems of multinational firms, which is a preview of the following 34 chapters. These problems are as follows: translation of foreign currencies; reports on exposure to risk of loss on a net monetary position in a foreign currency; geographical spread of assets and sources of income; expropriation and nationalization of properties; partial divestitures by government fiat; exclusion or inclusion of foreign subsidiaries in consolidated financial statements; differences in accounting principles and practices between the U.S. and foreign countries; statutory audit requirements in many foreign countries; budgets and forecasts in floating currencies; subconsolidations by countries; transfer prices for tax purposes (border values); allocation of home country expenses to foreign subsidiaries; foreign tax credits; and tax planning.

Every chapter in the book has a bibliography except one. In addition, five chapters have appendices, and one chapter has three appendices as well as a glossary, because it treats the subject of financial statement translation. A comprehensive glossary is appended at the very end of the book. Most of the chapters run to a few pages; only one on intercompany transactions (41 pages) and one other (24 pages) are of inordinate length. The references in the bibliographies are very complete.

This volume certainly attains its objective of furnishing authoritative material for financial managers and their staffs. With such a purpose, it must be highly technical in character, with a multiplicity of heterogeneous statements and reports. Its comprehensiveness indicates that it might well be regarded as a manual on multinational corporation accounting or even as a miniature encyclopedia. This book is an invaluable tool not only for financial managers but for international accountants.

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Professional Firm Publications

JAMES H. SCHEINER, *University of Tennessee-Knoxville*

This is the third of a new series designed to highlight accounting firms' publications of possible interest to academics. In recent years the largest public accounting firms have increased the quantity and quality of their accounting publications. Single copies are usually available upon request from the nearest office.

Assessing Internal Accounting Control: A Workable Approach by Albert S. Martin, Jr. of Sun Oil Company and Kenneth P. Johnson of the firm which published the book, Coopers & Lybrand, reports on a method available to management to appraise a firm's internal control system. The method, based upon Coopers & Lybrand's auditing approach, is presented in the context of an experiment to meet current needs. After a brief discussion of this approach, the implementation, evaluation, and results of the method are considered (32 pages).

Electronic Banking, published by Price Waterhouse & Co., is a summary of the current status of, and possible future developments in, electronic banking. The volume, based upon published materials and interviews with executives from diverse industries and geographic regions, is designed to address issues and problems for management in using electronic funds transfer (48 pages).

Federal Income Taxes Life Insurance Companies by Ernst & Ernst, a comprehensive discussion of insurance company taxation, consists of 17 chapters on topics ranging from life insurance reserves to business combinations and holding company formations. Indexes to cases, IRS rulings, code sections and Treasury regulations and Congressional materials are provided. The firm plans to issue bulletins periodically to update the volume (459 pages).

The New Management Imperative, by Touche Ross & Co., discusses compliance with the accounting provisions of the Foreign Corrupt Practices Act. The first part of the volume provides a general discussion of the act and its significance to management and directors. The second part, based upon the firm's internal manuals, discusses internal control procedures and methods (43 pages).

Segment Information, by Arthur Andersen & Co., discusses the disclosure of segment information based upon an analysis of 250 annual reports for 1977 and emphasizes situations where alternative policies are possible. Topics covered include industry segments, geographic areas, and profitability levels reported. Samples of firms' disclosures are provided in an appendix (30 pages).

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APRIL, 1979 PLACEMENT INFORMATION SECTION

The deadline for information to be included in the "Placement Information" section is two months prior to the date of publication; i.e. *February 1, May 1, August 1, and November 1. Placement advertising and replies should be sent to the American Accounting Association, 5717 Bessie Drive, Sarasota, FL 33583. All replies to box numbers should be on separate sheets to facilitate forwarding.*

#201 PORTLAND STATE UNIVERSITY located in Portland, Oregon, invites applications for permanent appointments in accounting beginning September 1979. Available positions are at the Assistant and Associate level. Applicants should possess a doctoral degree in accounting although candidates at an advanced dissertation stage will also be considered. Performance evaluation at PSU is based upon a judicious blend of effective classroom teaching, research and publication, and university and community service. The standard teaching load is 9 quarter hours. Programs are offered at both the undergraduate and graduate levels. The department enjoys a very close relationship with the professional accounting community in the state. Vita should be directed to Dr. Michael R. Gaines, Head, Department of Accounting, Portland State University, Portland, Oregon 97207. PSU is an equal opportunity affirmative action employer. All interested persons are encouraged to apply.

#202 BS (ACCOUNTING), JD, LLM (TAXATION), SJD; CPA; Member of Bar; formerly professor, tax consultant, attorney USA; resident in Europe disposed to relocate; experience in Europe management, administration, finance, accounting, tax, auditing USA subsidiaries, Big 8 firms; professorial assignments in Europe undergraduate, graduate business programs, courses Financial/Managerial Accounting, International Accounting, Financial Management, International Financial Management, Business Principles, International Business, International Management, International Marketing; courses in preparation International Taxation, Legal Aspects of Multinational Operations, Auditing; seeks affiliation with University having a Business Studies program with internationally oriented offerings. Postbus 254, 1000 Bruxelles 1, Belgique.

#203 BBA, MBA, CPA, DBA STUDENT (major accounting, minors in finance and management) seeks 9/12 month appointment beginning August/September 1979 to earn finances for completion of doctorate the following year. Coursework in minors will have been completed at end of Summer 1979. 4½ years Big Eight public accounting experience and full-time university teaching experience. Prefer southeastern location.

#204 MBA, CPA CANDIDATE, age 32, experienced in teaching with several years practical experience including three at the controllership level. Teaching experience (2+ years) includes a wide range of accounting/business courses. Desires teaching position. Available Fall, 1979.

#205 PH.D. WITH SEVERAL YEARS ACADEMIC and practical experience in the field of accounting seeks a teaching position with a college or university that will afford an opportunity for part-time instruction upon retirement. (ACADEMIC: undergraduate and graduate. PRACTICAL: public—Big Eight; private and industrial.) Physical stamina—excellent. Published.

#206 CHAIRPERSON TO DIRECT eight member Accounting Department. Ph.D. preferred. Salary $22,000 to $26,000 for nine-month academic year, summer assignment also available. Also position for assistant or associate professor to teach in area of accounting interest. Salary $20,000 to $23,000, summer teaching also available. Medical and dental insurance program, TIAA retirement plan. Applications will be accepted until May 1, 1979. Send resume to Accounting Search Committee, School of Business & Economics, Central Washington University, Ellensburg, WA 98926. Central Washington University is an AA/EEO/Title IX employer.

#207 A FACULTY POSITION may be available in the Accounting Department of Florida International University in 1979–80. The School offers a BBA in accounting and graduate degrees leading to the MBA, the MIB and the MSM. The last-named can be obtained in accounting, international accounting or taxation. The department teaches about 850 undergraduate majors and nearly 150 graduate majors. Faculty are encouraged and aided to conduct research and several are active in the publication area. There are good opportunities for research and consulting in Miami and further afield. Equal Opportunity Employer. Contact: Dr. Kenneth S. Most Chairman, Accounting Department Tamiami Trail, Miami, Florida 33199, (305) 552-2581.

#208 ROCHESTER INSTITUTE OF TECHNOLOGY has two openings for Assistant/Associate Professor of Accounting starting in September, 1979. Opportunity to teach in undergraduate and graduate programs. Requirements include Ph.D. or A.B.D. Competitive salary and rank will depend upon qualifications of the applicant. Summer teaching available if desired. The Institute is an equal opportunity/affirmative action employer. Applicants should send resume to Dr. Edward A. Johnson, Dean of the College of Business, Rochester Institute of Technology, Rochester, New York 14623.

#209 ANNOUNCEMENT OF VACANCIES, Department of Accountancy. Positions available: Assistant Professor, Associate Professor and Professor Graduate and Undergraduate programs. Effective dates of appointment: September 1, 1979, February 1, 1980 and September 1, 1980. Doctorate, CPA desirable, teaching experience at the four-year university level and publications. This University is subject to all laws governing affirmative action and equal employment opportunity. All interested persons are encouraged to apply. Salary per annum is up to $34,000 depending on qualifications, for two semesters (9 months). Summer Session extra compensation. Any interested person should send letter and resume to: Dr. Martin Mellman, Chairman Department of Accountancy Bernard M. Baruch College 17 Lexington Avenue New York, New York 10010.

#210 MASTERS AND Ph.D. intending students are invited to apply for admission to the Department of Accounting and Financial Management at the University of New England, Armidale, New South Wales, Australia. Masters three-semester programs may be taken with specialist concentration in Accounting, Finance, Systems, Small Business Management and Legal Studies. Ph.D. three-year programs involve a major dissertation. No coursework, preliminary examinations or continuous residence in Australia are required. Masters intake is March and July. Ph.D. intake is flexible. Some TA and RA opportunities exist. For further details write Head, Department of Accounting and Financial Management.

#211 DOCTORAL STUDIES SUPERVISOR: We are seeking a doctoral studies supervisor who will take charge of the doctoral program in Accountancy and also participate in the MBA program in Accountancy. The doctoral program in Accountancy currently has an enrollment of 20 students and the MBA program in Accountancy has an enrollment of 600 students. We are located in the midtown area of New York City and offer many of the opportunities of that location. Requirements for the position are the Ph.D. and a scholarly research and publications record. Send resume to Dr. Martin Mellman, Bernard M. Baruch College, 17 Lexington Avenue, New York, New York 10010.

#212 THE UNIVERSITY OF SASKATCHEWAN, Saskatoon, Canada, invites applications for summer positions (1979), for one- or two-year visiting appointment in Accounting (effective July 1, 1979), and for a permanent position (effective January 1, 1980). Ph.D. preferred; Masters with professional qualifications acceptable. Rank and salary open. Present accounting faculty complement of thirteen hold Ph.D.s from Michigan, Michigan State, Minnesota, Washington, and Missouri. Teaching load normally 2–3 courses per term over mid-September to mid-April academic year. Permanent faculty members expected to have strong research interests. Enquiries including current resume should be mailed to Dr. George C. Baxter, Accounting Area Chairman, College of Commerce, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, S7N OWO.

#213 MACQUARIE UNIVERSITY, SYDNEY, AUSTRALIA. Applications are invited for appointment to a Chair of Accounting in the School of Economic and Financial Studies, tenable not before 1 January, 1980. Applicants should be highly qualified academically and have extensive teaching and research experience in accounting. Further details about the School and the framework within which the appointment is to be made is included in the additional information available to applicants. Salary $A33,061. Further information should be obtained from the Registrar, Macquarie University, North Ryde, New South Wales, 2113. Applications close on 30 June, 1979.

#214 OUR GROWING NEEDS have created the need for a position in accounting for September, 1979. Ph.D. or D.B.A. in accounting; may consider ABD with completion date or MBA/CPA. Business, teaching, and research experience preferred. The department of business and economics has about 800 majors. Rank is open and the salary and benefits are extremely competitive and rewarding. Submit credentials to Dr. Clement J. Nouri, Hiring Coordinator, Department of Business Administration and Economics, SUNY at Brockport, Brockport, NY 14420.

#215 ACCOUNTING FACULTY—August 1979 Opening—Doctorate preferred/ABD considered. Professional experience and certification desirable. Teaching responsibility for both undergraduate and graduate courses. Normal instructional load is twelve hours per semester, usually consisting of two preparations. As often as possible course assignments reflect instructor preference. Both baccalaureate and graduate program are AACSB accredited. Contact: Frank H. Besnette, Dean Northern Arizona University, College of Business Administration, CU Box 15066, Flagstaff, AZ 85011.

#216 ACCOUNTING FACULTY—Claremont Graduate School and Claremont Men's College have a joint opening for a senior accounting educator. C.M.C. has undergraduate accounting and C.G.S. has an M.B.A./Ph.D. program and an Executive Management Program. The preferred interest/skill mix is in accounting for managers, including some combination of planning and control, cost benefit analysis, and information systems. We are part of the Claremont cluster of six colleges which combines the strengths of the small college and the large university. We are an Equal Opportunity and Affirmative Action employer. Send resume to: J. P. Giles, Chairman, Business Faculty, Claremont Graduate School, Claremont, Ca. 91711.

#217 ACCOUNTING: Assistant or Associate Professor. Position available August, 1979. Ph.D. or DBA required. Will consider ABD actively engaged in working toward a realistic completion date. CPA desirable. Salary and rank competitive depending on qualifications and experience. Full range of undergraduate and graduate courses. Excellent living conditions in progressive, modern metropolitan area. Send resume to Dr. Frederick D. Whitehurst, Chairman, Department of Accounting, Old Dominion University, Norfolk, VA 23508. An Affirmative Action Equal Opportunity Employer.

#218 ALABAMA—BIRMINGHAM has faculty openings for all 1979 at all ranks. Ph.D. or DBA required, although ABD will be considered at assistant rank. CPA or CMA highly desirable. Prefer applicants with strong interests in tax, systems, or not-for-profit area. Applicants for associate or professor rank must have considerable teaching experience, demonstrated ability in research and publication and active involvement in professional organizations. Competitive salaries. Address inquiries to: Dr. Keith Bryant, Jr., Department of Accounting, University of Alabama in Birmingham, Birmingham, Alabama, 35294. An Equal Opportunity, Affirmative Action Employer.

#219 FACULTY POSITION: Assistant or Associate Professor of Accounting, September, 1979. Minimum of master's degree with CPA or CMA. Doctorate and/or professional experience preferred. Send comprehensive resume to Randy Howard, Chairman, Search Committee. Eastern Montana College, Billings, MT 59101. An Equal opportunity/Affirmative Action Employer.

#220 CALIFORNIA STATE UNIVERSITY, SACRAMENTO, has faculty openings in the Department of Accounting and Management Information Science beginning September 1979 in the Undergraduate and the Master programs; both are accredited by the AACSB. The openings are in the following two areas: (1) Accounting, and (2) Computer-based Information Systems. The faculty candidate will be expected to teach undergraduate and graduate level courses, to engage in instructional-related duties and other activities; more emphasis on teaching effectiveness. Salary and rank open, commensurate with academic preparation and professional experience. Appropriate doctorate (or near the final state of completion) required; professional certification (e.g. CPA) or progress towards such certification, desirable. California State University, Sacramento, is an Equal Opportunity Affirmative Action employer. Applications should include a curriculum vitae and names and addresses of three references. Applications should be addressed to: Dr. Donald H. Ford, Chair, Department of Accounting and Management Information Science, School of Business and Public Administration, California State University, Sacramento, 6000 J Street, Sacramento, California 95819.

#221 THE STATE UNIVERSITY OF NEW YORK at Binghamton has two openings for Accounting faculty with interest in financial and/or management accounting. Rank is dependent upon qualifications. Salary and fringe benefits are competitive. Ph.D. candidates are encouraged to apply. SUNY-Binghamton is an equal opportunity/affirmative action employer. Send resume to Professor Bikki Jaggi, Chairman, Accounting Program, School of Management, SUNY-Binghamton, NY 13901. (Telephone 607-798-2674.)

#222 WAYNE STATE UNIVERSITY is seeking faculty members in Accounting. Teaching opportunities within our undergraduate and MBA programs are available in all specialties. Earned doctorate and CPA or CMA are preferred, but ABDs will be considered. Salary and rank will be commensurate with qualifications and experience. These positions should be especially attractive to persons desiring to work with the business community because of the University's strategic location and close ties with firms in the metropolitan area. Wayne State University, a large, stage-supported institution, is an equal opportunity/affirmative action employer. All qualified candidates are encouraged to apply. Please send vita to Professor A. C. Roberts, Chairman, Department of Accounting, 300 Prentis Hall, Wayne State University, Detroit, Michigan 48202.

#223 SUFFOLK UNIVERSITY is seeking Assistant/Associate Professors in Accounting starting in September 1979. Associate rank requires terminal degree and previous teaching experience. ABDs with significant progress on dissertation and MBAs, CPAs with confirmed plans to continue graduate studies considered at the Assistant Professor level. Suffolk University, located in the historic Beacon Hill area of Boston, enrolls approximately 6,500 students. The College of Business Administration/Graduate School of Administration offers the BSBA, BSPA, MBA, and MPA degrees to over 2,300 full- and part-time students. The College presently is seeking AACSB accreditation. Please submit resume and inquiries to Dr. Weldon H. Walker, Chairman, Department of Accounting, Suffolk University, Boston, Massachusetts 02114.

#224 FACULTY OPENINGS, 1979–1980. Birzeit University, an independent Arab University in the Israeli-occupied West Bank of Jordan, has faculty openings for the academic year 79/80 in the following fields: Accounting; Economics; Finance; Management; Marketing. Experienced and interested persons with the Ph.D. are invited to apply. Applicants with the Masters degree are also considered. The University is a co-educational institution with an enrollment of about 1200 students. It is located in the town of Birzeit, 26 Kilometers northwest of Jerusalem. English is the language of instruction. Address inquiries to Dean, Faculty of Commerce & Economics, Birzeit University, Birzeit, West Bank, via Israel.

#225 UNIVERSITY OF TEXAS AT ARLINGTON, invites applications for Assistant Professor of Accounting for Fall, 1979 with doctorate in accounting. Will consider ABD candidate where evidence shows probable early completion of dissertation. Professional certification and experience (business and teaching) are desirable. Full time and part time temporary instructorships requiring master's degree (concentration in accounting) and CMA or CPA are often available (sometimes on short notice) and openings are expected for Fall, 1979. For either regular or temporary positions, please send letter of interest and resume to D. J. Casler, Chairman, Department of Accounting, University of Texas at Arlington, Arlington, Texas 76019. The University of Texas at Arlington is an Equal Opportunities/Affirmative Action employer.

#226 THE UNIVERSITY OF CENTRAL ARKANSAS, Conway, has two openings starting Fall, 1979. One position was created by growth of the department, which is heavily teaching and consulting oriented. Candidates with doctorate will be given preference but ABD's and Master's —CPAs/CMAs are actively encouraged to apply. Salaries are negotiable and depend on applicants' qualifications and experience. UCA is an affirmative action/equal opportunity employer. Send resumes including names of references to Chairperson, Department of Accounting, UCA P.O. Box 1742, Conway, Arkansas 72032.

#227 INSEAD, FRANCE. Applications are invited for positions in Accounting at this European business school. Research interests in international and European accounting desired, as well as teaching capability in core accounting subjects. For further details write to: Professor M. W. E. Glautier, Institut Européen d'Administration des Affaires, Boulevard de Constance, F-77305-Fontainebleau, France.

#228 PEPPERDINE UNIVERSITY, MALIBU, CA. is seeking applicants for a tenure track accounting position at any rank. Prefer managerial interest. Ph.D. is preferred, but ABDs or MBAs with certification will be considered. Salary level ($21,124–32,778 for 9½ months). Applicants should have a primary interest in undergraduate teaching with strong secondary interests in research and appropriate professional activity. The position is within Seaver College, a residential liberal arts college. Seeking faculty who will contribute to the value-centered education of a non-sectarian Christian University. Send resume to Dr. Jere E. Yates, Chairman; Business Administration Division; Pepperdine University; Malibu, CA. 90265.

#229 ACCOUNTING FACULTY POSITION for Sept., 1979. Tenure track position. Ph.D. or near doctorate required. Submit C.V. to Prof. E. Lutz, Economics Department, Brooklyn College, Brooklyn, N.Y. 11210. An affirmative action/equal opportunity employer.

#230 STEPHEN F. AUSTIN STATE UNIVERSITY is seeking candidates for a faculty position leading to tenure. Stephen F. Austin State University is located in East Texas with easy access to Houston and recreational areas. The University enrollment is over 10,000 of which over 2,000 are in the School of Business. The undergraduate program is AACSB accredited. The primary emphasis is on teaching; however, research and publishing are encouraged. Applicants should have a terminal degree or be near completion of a doctorate. Applicants should contact Professor Eugene Sauls, Department of Accounting, Box 3005, SFA Station, Nacogdoches, Texas 75962.

#231 LOYOLA COLLEGE OF MARYLAND has faculty openings in its Department of Accounting beginning September 1979. Ph.D. or DBA preferred; Master's with CPA considered. Relevant experience desirable. Rank and salary competitive. Undergraduate, MBA, and Master of Professional Accountancy degree programs. Normal load: three sections, two preparations. Overloads available. Send resume to Jim Patton, Chairman, Department of Accounting, 4501 North Charles Street, Baltimore, Maryland 21210. EOE/AAE.

#232 WASHINGTON STATE UNIVERSITY invites applications for the position of Chairperson of the Department of Accounting and Business Law. Position begins September 16, 1979. Academic rank and salary will be commensurate with experience. The Chairperson must have an earned doctorate in a related field teaching experience in graduate and under-graduate courses, and a demonstrated record in research and publications. Send resumes and inquiries to Gary M. Walton, Dean of the College of Business and Economics, Washington State University, Pullman, Washington 99164. Candidate evaluation will begin on March 15, 1979 and continue until the position is filled. WSU is an EE/AA employer.

#233 EXPERIENCED ACCOUNTING INSTRUCTOR seeks permanent teaching position in the Northeast. I have had ten years' experience including government accounting, private business and teaching. I possess an MS plus 30 hours toward a doctoral degree in accounting at an AACSB institution. Since my educational plans are presently uncertain, I am seeking a school that would not require a doctorate for promotion or tenure.

#234 ASSISTANT PROFESSOR(S) OF ACCOUNTING. Employment date: Beginning Fall 1979 or later. Require: Ph.D. with a major in accounting CPA or CMA desirable. Teaching interests may be in Financial, Managerial, Auditing, Taxation, or Information Systems with secondary in one or more of the above areas. The courses would be at the B.A., M.B.A., Ph.D. levels. Research and publication is expected in accounting topics. Other duties include academic advising; departmental, college, and university committees; maintaining contact with accounting professional and business organizations; guidance to doctoral students in dissertation research. An affirmative action employer and applications from women or minority candidates are particularly invited. Send letter of inquiry and resume to Dr. Harold Sollenberger, Chairman, Dept. of Accounting & Financial Admin., College of Business, Michigan State University, East Lansing, MI 48824.

#235 ACCOUNTING. Morehead State University is seeking an experienced person to head its Department of Accounting and Data Processing. Doctorate, evidence of professional distinction, demonstrated leadership ability and strong academic professional accounting background required. Salary based on qualifications. Available July 1, 1979. Letter of application and resume by May 15 to Mr. Gary VanMeter, Chairman, Accounting Search Committee, UPO 1317, Morehead State University, Morehead, KY 40351. MSU is an Equal Opportunity, Affirmative Action Employer.

#236 ACCOUNTING. Morehead State University is seeking an assistant or associate professor of accounting. Doctorate preferred. Teaching duties on graduate and undergraduate levels. Available August, 1979. Salary based on qualifications. Letter of application and resume by May 15 to Mr. Gary VanMeter, Chairman Accounting Search Committee, UPO 1317, Morehead State University, Morehead, KY 40351. MSU is an Equal Opportunity, Affirmative Action Employer.

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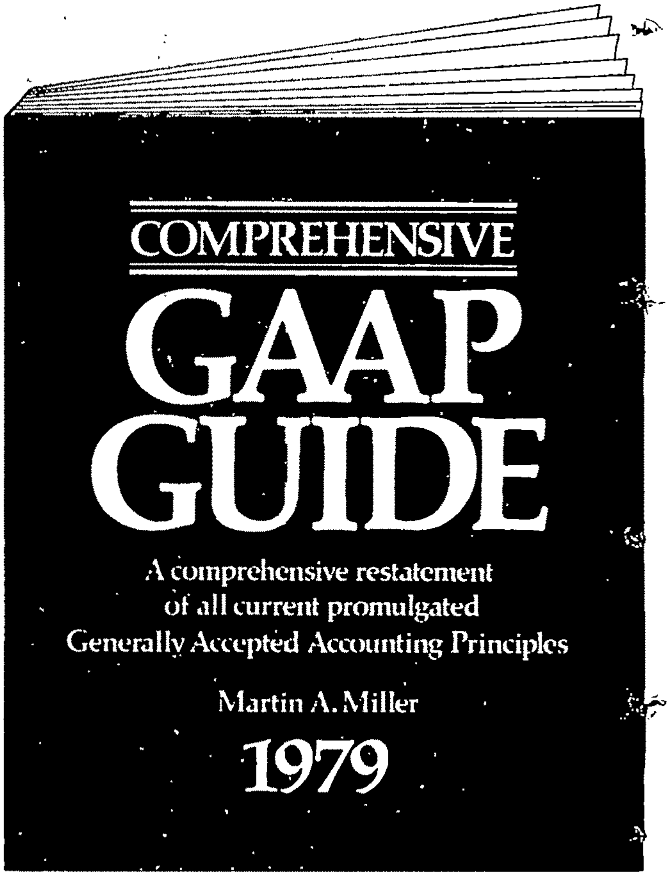
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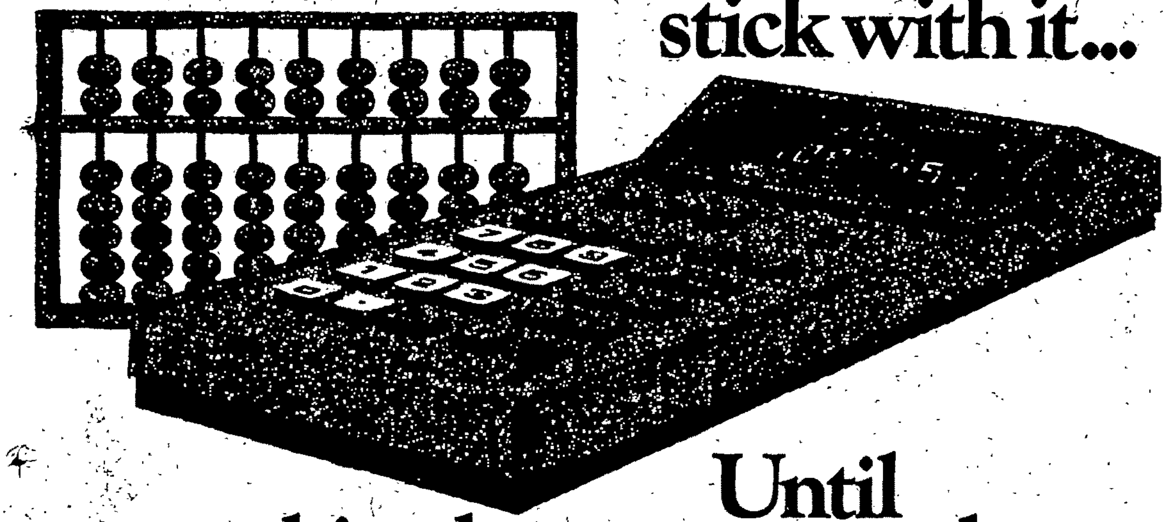

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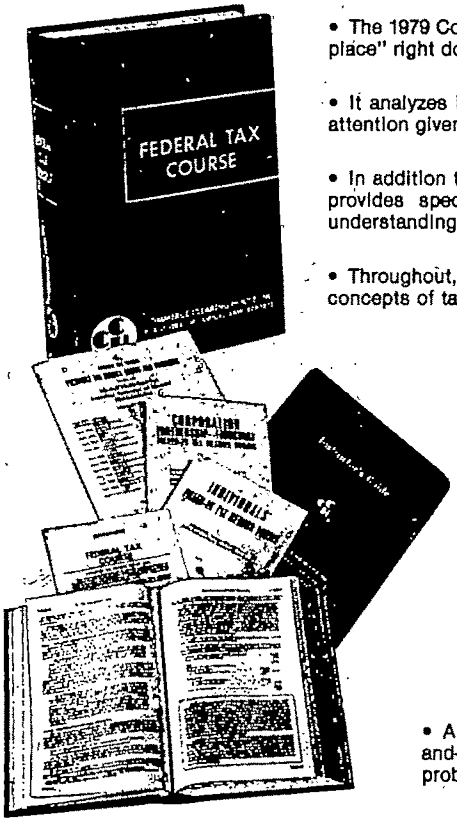

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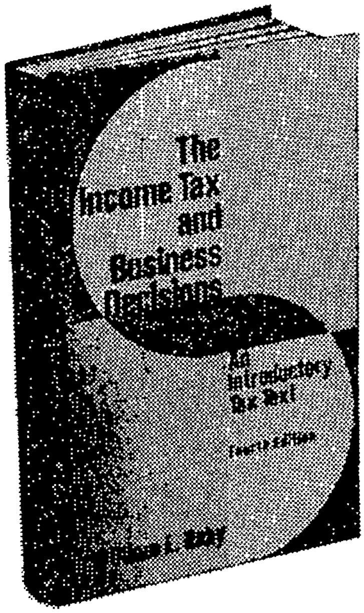

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1979 DISTINGUISHED INTERNATIONAL LECTURERS IN ACCOUNTING

The American Accounting Association is pleased to announce the selection of its 1979 Distinguished International Lecturers in Accounting. William H. Beaver, Stanford University, was selected as the United States professor to visit educational institutions in Europe during March and April. Professor Baruch Lev, Tel-Aviv University, was selected as the Distinguished Lecturer to visit schools in the United States and Canada this spring.

The American Accounting Association is appreciative of the financial support this program has received from Exxon Corporation. The Exxon Controller's Grant in the amount of $3,500 is used by the Association to provide financial support of this program.

As mentioned in the October, 1978 issue of this newsletter, the American Accounting Association will send a Distinguished International Lecturer in Accounting to Latin America during 1980. The individual selected as the 1980 AAA Distinguished International Visiting Lecturer in Accounting will tour Latin American universities in the spring of that year. Individuals who wish to nominate members of the Association for consideration as the 1980 AAA Distinguished International Visiting Lecturer in Accounting should send their nominations to the Administrative Secretary at the Association's offices in Sarasota, Florida. Nominations should be in the form of a letter to the Committee on International Faculty Exchange and contain the name and academic affiliation of the nominee, name and address of the person making the recommendation, and reasons why the nominees should be considered qualified for the Distinguished International Lectureship.

Colleges and universities in the United States who would like to act as a host institution for the 1980 Distinguished International lecturer in Accounting from abroad should contact Paul L. Gerhardt at the Association's administrative offices. The main criteria for selection as a host school is the school's desire to serve in that capacity. The Selection Committee will, however, attempt to insure that the combination of schools selected form a good balance in terms of location, size, nature of program, etc. The United States schools participating in this program will be expected to pay a fee to the Association and to pay for the meals and lodging for the period of the lecturer's visit to the campus.

AAA 1979 United States Distinguished International Lecturer in Accounting

William H. Beaver has been selected as the United States Professor to lecture at universities in Western Europe during 1979. He received his B.B.A. degree from the University of Notre Dame and the M.B.A. and Ph.D. from the University of Chicago. He began his teaching career at the Graduate School of Business, University of Chicago, in 1965 and left to join the faculty at Stanford University in 1969. He is presently the Thomas D. Dee II Professor of Accounting at Stanford University.

William Beaver has published extensively in *The Accounting Review*, *Journal of Accounting Research*, and *Journal of Accountancy*. He is a C.P.A. (Illinois) and has served on the editorial boards of *The Accounting Review* and the *Journal of Accounting Research*. He has won many awards, including the American Accounting Association's Outstanding Manuscript Award (1967), the Outstanding Contribution to Accounting Literature Award (AICPA—1969), and the Journal of Accountancy Literary Award (1978). In addition to serving on the editorial board for The Accounting Review, his service to the American Accounting Association has included membership on the AICPA Research Review Committee, Committee on Accounting Theory Construction and Verification, Committee on Methodology in Accounting Research, Committee on External Measurement and Reporting, and the Committee on Financial Accounting Standards. He served as Chairman of the Committee on Financial Accounting Standards during 1977–78 and is serving in that capacity again this year.

As the 1979 U.S. Distinguished International Lecturer in Accounting, William Beaver will lecture at universities in England, Norway, Belgium, France, Germany, and Switzerland.

1979 AAA International Lecturer in Accounting

Baruch Lev has been selected by the American Accounting Association to lecture in the United States during the spring of 1979. Baruch Lev is Professor and Dean of the Faculty of Management, Tel-Aviv University. His undergraduate studies in business administration and auditing were completed at the Tel-Aviv branch of the Hebrew University. After graduation, he worked for three years as a senior auditor and managing consultant while also engaged as a part-time instructor of accounting. His graduate study was at the University of Chicago where he acquired the M.B.A. and Ph.D. degrees. He has taught at the University of Chicago, Hebrew University of Jerusalam, Tel-Aviv University, and the Wharton School, University of Pennsylvania. A member of the American Accounting Association since 1969, Baruch Lev has served on the editorial board for *The Accounting Review* and on the 1972–73 Committee on Accounting for Human Resources.

Baruch Lev's list of articles published is voluminous and his writings are well-known to members of the Association. He is the author of two books, one of which, *Accounting and Information Theory*, was published by the American Accounting Association as volume 2 of its Accounting Research Series.

The 1979 Distinguished International Visiting Lecturer in Accounting to the United States will visit the following schools this spring:

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JULY 1979

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The American Accounting Association was founded in 1916 as the American Association of University Instructors in Accounting. Its present name was adopted in 1936. The Association is a voluntary organization of persons interested in accounting education and research. Full membership entitles one to receive *The Accounting Review* and *Accounting Education News* and to purchase Association publications at a discount. Associate members, limited to full-time students enrolled in institutions of higher education, receive *The Accounting Review*.

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VOL. LIV JULY 1979 No. 3

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The Impact of Accounting Regulation on the Stock Market: The Case of Oil and Gas Companies

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ABSTRACT: Few, if any, proposals for a change in an accounting method have triggered such a strong and widespread reaction as did the FASB's oil and gas July, 1977, exposure draft, which proposed to put an end to the "full cost" method. Many of the arguments raised in this controversy touched on the impact of the proposed accounting change on capital markets. To provide evidence on the market impact, the behavior of stock prices of oil and gas companies was analyzed in this study. Results indicate that the release of the exposure draft was associated with a decline of about 4.5 percent, on average, in the stock prices of "full cost" companies during a period of three days succeeding the release of the exposure draft. This market reaction appears to be relevant to accounting policy makers.

A Financial Accounting Standards Board (FASB) Exposure Draft released on July 18, 1977, [FASB, 1977a][1] proposed to put an end to the "full cost" accounting method used by many oil and gas producing companies to account for exploration costs, and recommended that all such companies be required to follow the "successful efforts" method. On December 5, 1977, the FASB issued its Statement No. 19 affirming the proposal announced in the Exposure Draft. Full cost (FC) and successful efforts (SE) are the two basic methods used to account for oil and gas exploration costs. While several variations of each method are found in practice, the principal difference between the two methods is in the treatment of costs that cannot be directly related to the discovery of specific oil and gas reserves. Under the SE method, costs that are known not to have resulted in discovery of gas and oil reserves (*e.g.*, the cost of an abandoned property, or the cost of drilling an unsuccessful well) are charged to current expenses and not carried forward as assets. Under the FC method, on the other hand, all costs incurred in searching for oil and gas reserves within a large geopolitical cost center, such as a country or a continent, are carried forward as an asset subject to a limitation that the total amount carried forward does not exceed the estimated value of the reserves,

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[1] The Exposure Draft is dated July 15, 1977, (a Friday), but it was actually released to the public on Monday, July 18, 1977.

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wherever located and whenever discovered in that country or continent. The new accounting standard came as a result of the 1975 Energy Policy and Conservation Act, which charged the Securities and Exchange Commission (SEC) with implementing oil and gas industry accounting standards by December 22, 1977. As the FASB had already scheduled a project to develop oil and gas standards shortly before the law was passed, the SEC said it would rely on the FASB to provide the oil and gas rules.

Few, if any, proposals for a change in an accounting method have triggered such a strong and widespread reaction from interested and concerned parties as did the oil and gas Exposure Draft. Not unexpectedly, this reaction was initiated by the affected companies—more than 100 mostly small oil and gas producers currently using the FC method. The main argument of FC users was that a switch to the SE method would (a) substantially depress reported earnings and equity figures, and (b) increase significantly the volatility of earnings over time (*vis-à-vis* the smoother earnings series resulting from the FC capitalization process). Consequently, it was argued, the ability of small producers to raise capital in the stock and money markets would be seriously inhibited, resulting in a cutback of new explorations and in a deterioration of the competitive position of independent oil and gas producers.[2] The argument concerning the depressing effect of the proposed switch to the SE method on earnings and equity is corroborated by recent financial statements of oil and gas producers, which were required by the SEC Staff Accounting Bulletin No. 16 to disclose the potential effects of the FASB Exposure Draft. An analysis of these financial reports by the FASB staff [FASB, 1978] found that 70 out of 109 FC firms (64 percent) would have their earnings decreased by five percent or more under SE, and 86 out of 117 FC firms (74 percent) would have their owners' equity decreased by five percent or more under SE.

The full-costers' position obtained widespread support. For example, the Justice Department urged the SEC to postpone adoption of a uniform standard of accounting for oil and gas producers until the SEC could demonstrate that such a standard would improve the flow of information to investors or would not have anti-competitive aspects. The Federal Trade Commission (FTC) argued that the SEC should not adopt the SE method since it has not been shown to be more accurate than the FC method in reflecting the economic realities of the oil and gas industry. The FTC further argued that competitive harm would likely be inflicted on the independent sector by the proposed change in accounting method. Support for the full-costers' position came also from Ralph Nader's Congress Watch, which submitted a statement to the SEC urging it to overrule the FASB since, among other things, SE accounting may encourage risk aversion at a time when risk-taking by energy corporations is essential.

The FASB and its supporters defended the proposed accounting change by arguing that (a) the SE method is conceptually more adequate than the FC method; (b) uniformity of accounting for oil and gas explorations will eliminate the burden of inconsistency, noncomparability, and misunderstanding in the capital markets, and, thus, foster competition in capital allocation; and (c) many small independent producers have been using the SE method for a long time without apparent adverse effects on their ability to raise capital and to compete with the large producers.[3] The controversy surrounding the FC-SE issue was even viewed by some observers as potentially harming the credibility of the FASB and possibly leading to the public sector taking over the task of establishing accounting standards.[4]

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[2] For example, "It's possible that if the successful-efforts ruling goes through, we'd have to get out of the oil and gas business," a statement made by Paul Seegers, president of Centex Corp. Or, "Successful-efforts is a disincentive to increased exploration, and I'm certain that was not Congress's intent," a statement by Joseph C. Walter, Jr., president of Houston Oil and Minerals Corp. The above statements were quoted in "An FASB Ruling . . ." [1977].

The arguments mentioned above touch on various rather complicated issues, such as the conceptual adequacy of the FC and SE methods, the impact of the proposed accounting change on managerial behavior (*e.g.*, is it a disincentive to risk-taking in exploration?), the effect on competition in the oil and gas industry, and the ability of FC firms to raise money in capital markets after switching to the SE method. The last of these issues—the impact of the proposed change on capital markets—appears to be both of considerable concern and relatively tractable. This concern is manifested, for example, in the Department of Justice submission to the SEC (February 27, 1978, p. 20), arguing that:

> ... [the SEC] must determine whether the proposed mandated switch would likely affect capital market behavior in ways which would significantly disadvantage the competitive viability of any segment of the oil and gas producing industry ...

The question, then, is whether the accounting change would adversely affect the equilibrium values of firms' equity securities. Given efficient capital markets, if such an adverse effect on equity values is expected by investors, we should observe a reaction of stock prices of companies using the FC method to the release of the Exposure Draft, resulting from investor reassessment of stock values. Thus, by examining the behavior of oil and gas stock prices during the Exposure Draft announcement period, inferences can be made regarding the potential impact on the capital market of the proposed accounting change.

The objective of this study is to perform such an analysis of stock price behavior. The empirical results of this study indicate that the release of the Exposure Draft can be associated with a decline of about 4.5 percent, on average, in the stock prices of FC companies during a period of three days, relative to a decline of about one percent in the stock prices of SE companies. This price decline cannot be ignored by policy makers in assessing the market consequences of the proposed accounting switch, given that it was triggered by an exposure draft only, as the final decisions of the FASB and the SEC were not yet known to investors, and as the exact effects of the accounting switch on the financial statements of individual firms could not be fully assessed.[5]

I. PREVIOUS STUDIES

Two empirical studies were recently conducted on the security price reaction to the Exposure Draft release: one by Dyckman and Smith [1979] performed at the request of the FASB, and the other by Collins and Dent [1979]. The conclusions reached in these studies were substantially in conflict. While Dyckman and Smith concluded that the Exposure Draft did not have a significant effect on stock price returns of FC companies, Collins and Dent reported that following the release of the Exposure Draft there occurred a significant downward shift in the returns of FC firms' stocks relative to those of SE stocks, and this downward shift was sustained over a period of six months.[6] The conflicting results might be due, partially or fully, to differences in samples and in the statistical techniques used. Collins and Dent excluded from their sample Canadian firms listed on U.S. exchanges (which were included in the Dyckman and Smith study), arguing that the extent to which such firms would be compelled to comply with the proposed accounting change was uncertain, and that most of these firms were involved in a major oil discovery in the Pembina area, a fact which might have impacted their stock price behavior. With respect to statistical techniques, Collins and Dent argued for the use of non-parametric tests of significance (between returns of FC and SE companies), given the cross-sectional dependence of the observations, while Dyckman and Smith used parametric tests.[7]

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[3] For an elaboration of the FASB's reasons for choosing the SE method, see Statement of Financial Accounting Standard No. 19 [FASB, 1977b, Appendix B].

[4] For example, "If the Commission determines that it should reverse the FASB with respect to Statement 19, the damage to the credibility of the Board will be great; whether it will be fatal or not no one can say,"—statement by A. A. Sommer, Jr., a member of the Financial Accounting Standards Advisory Council and former SEC Commissioner, at the SEC hearings on accounting practices for oil and gas producers.

[5] Indeed the SEC, not necessarily on the basis of these findings, decided for the time being to allow the use of both the FC and SE methods, see ASR 253, August 1978.

The approach taken in the present study differs considerably from that followed by Dyckman and Smith and by Collins and Dent. Both Dyckman-Smith and Collins-Dent were concerned with the permanency of the stock price reaction to the Exposure Draft release, namely, with the question of whether the decline in FC companies' stock prices around the date of release was subsequently reversed or not. Accordingly, the series of stock returns examined were very long—nine and 11 weeks subsequent to the Exposure Draft release by Dyckman and Smith, and 28 weeks in the Collins-Dent study. While the permanence issue is of interest, I believe it cannot be resolved in the case of the oil and gas Exposure Draft by the current methodology of observing stock price reaction to new information. The difficulty arises from the fact that stock prices react *continuously* to new information which is made public. Accordingly, it is extremely difficult to attribute an observed price change to a specific source of information, such as the Exposure Draft. For some kinds of recurring information, such as earnings and dividend announcements, this difficulty can be mitigated by using a large sample of firms operating in different industries and which release their earnings or dividend numbers on different dates. When stock prices of such firms are cross-sectionally aggregated by the day or week of information release, the observed sample averages around this date are comprised of individual stock prices pertaining to *different* time periods. Consequently, such a sample design can be expected to "average out" to a large extent the impact of other information items than the one focused on (*e.g.*, earnings). However, in the case of the Exposure Draft studies, such an over-time and across-industry randomization is impossible. All the sampled firms belong to the same industry and all the stock prices examined pertain to the same calenderical dates. Accordingly, it is highly doubtful whether price changes over a long period of time can be attributed to a specific source of information, as was done in the previous studies.

The preceding objection to the search for a gradual information effect over a long period becomes even more serious when the oil and gas industry is the object of study. This industry has gone through a particularly turbulent period during 1977, mainly due to the debate in Congress of the President's energy program. The chronicle of daily news items presented in the Appendix provides dramatic testimony of the continuous flow of important information potentially affecting oil and gas stock prices. Specifically, during each day of the two-week period surrounding the Exposure Draft release there appeared in *The Wall Street Journal* several articles concerning the oil and gas industry in general and specific firms in particular. Some of these news items appear to be at least as relevant to the valuation of stocks as the Exposure Draft. Thus, for example, on July 15, 1977, *The Wall Street Journal* carried two news items of considerable importance to oil companies: the rejection by the House of a proposal to deregulate gas prices, and the Senate decision to allow the Interior Department to explore for oil (see Appendix). A careful examination of the chronicle of events indicates that the large majority of news items appear to have had negative implications for the valuation of oil and gas companies' stocks. Such news items were probably responsible for the continuous downward revision of oil and gas stock prices observed by Collins and Dent over a period of 28 weeks after the release of the Exposure Draft. It, therefore, seems impossible to resolve the permanency question by attributing stock price changes over long periods, such as 11 weeks (Dyckman and Smith) or 28 weeks (Collins and Dent), to the Exposure Draft release.[8]

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[6] Collins and Dent also mention a third study of the Exposure Draft impact performed on behalf of the SEC. This study, using daily returns, reached conclusions similar to those of Dyckman and Smith's.

[7] There are some other, less important differences between the two studies, which are discussed in detail by Collins and Dent, *ibid.*

The above-mentioned difficulties, arising from the sample design (identical timing of stock prices and industry homogeneity of firms) and from the turbulent environment surrounding the oil and gas industry, dictated the following methodological characteristics of the present study.

1. The stock return data to be examined in the present study are *daily* returns, rather than the weekly returns examined in the Dyckman-Smith and the Collins-Dent studies. The daily flow of new information bearing upon oil and gas companies renders a period of a week too long for taking a single return observation and attributing it to a specific information item (*e.g.*, the Exposure Draft). Daily observations will allow a more refined analysis of the relationship between stock price behavior and the Exposure Draft release. Moreover, given the considerable "noise" affecting oil and gas stock prices, the "signal [*e.g.*, the Exposure Draft] to noise ratio" is substantially larger for daily data than for weekly data. Accordingly, the impact of a signal can more clearly be identified on daily than on weekly data.
2. The period examined in detail for the Exposure Draft announcement effect is relatively short—seven trading days, starting two days prior to the Exposure Draft release. This examination period was dictated by the impossibility (discussed above) of attributing price changes over a long period to a single information item. Furthermore, the

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[8] It is also hazardous to argue that by examining the *difference* between stock returns of FC and SE companies, one can control for all other information affecting the oil and gas industry, and thereby focus on the Exposure Draft effect. Various information items, such as an increase in the federal gasoline tax, might affect the stock prices of small, non-integrated oil companies, which mainly use the FC method, differently than the large, integrated companies, most of which use the SE method.

available evidence on capital market efficiency indicates that the impact of new information is fully reflected in stock prices within a *few days*.[9] Given efficient markets, it seems futile to search over periods of weeks and even months (as done in the previous studies) for the Exposure Draft effect on stock prices.

3. While in previous studies on the Exposure Draft, inferences were based mainly on sample averages, in the present study examination is extended to the individual firm level. This extension is intended to exploit more of the sample information (than is revealed by the means) and to allow for the possible effect of specific news items on individual firms.
4. A special effort was made to chronicle events having potential implications for oil and gas stock prices, which were reported during the Exposure Draft announcement period, thus isolating the effect of the Exposure Draft from the effects of other information items on stock prices.

II. Data and Models

A. *The Sample*

Several sources were used to compile a list of oil and gas companies whose stocks are traded on the New York and American Stock Exchanges. These sources were:

1. *The Oil and Gas International Yearbook, 1975–1976*, published by *The Financial Times*, London.
2. *U.S.A. Oil Industry Directory* (1977), issued annually by the Petroleum Publishing Company, publishers of the *Oil and Gas Journal*, Tulsa, Oklahoma.
3. *Standard Industrial Classification Index, 1977*, published by Standard & Poor's Corporation, New York.
4. *Securities Traded on Exchanges—Under the Securities Exchange Act of 1934, as of December 31, 1976*, published by the Office of Reports and Information Services, Securities and Exchange Commission, Washington, D.C.
5. The list of firms in L.J. Seidler, "Oil and Gas Exposure Draft Outlaws Full Cost Accounting," *Accounting Issues*, Bear Stearns & Co., August 15, 1977, p. 4–13.

The following checks were made on the firms included in the initial list compiled from the above sources:

1. In order to include in the sample only firms which engage in oil and gas *exploration* (*i.e.*, those that could be affected by the FASB ruling), we examined each firm's lines of business in both the 10-K report and *Moody's Industrial Survey*. Only those companies for which exploration activities were specifically mentioned in these sources were retained in the sample.
2. The accounting method used by each firm to handle exploration costs was determined from the "Accounting Policies" (or other) footnotes in the annual report section of the 10-K report. In cases where the description of accounting method was ambiguous, or a mixture of the two methods was used, the firm was deleted from the initial list.
3. Since our objective was to examine the reaction of stock prices to the FASB Exposure Draft, it was essen-

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[9] See, for example, the rapid daily stock price reaction to dividend announcements described in Foster [1978, pp. 350–52].

> tial to make sure that no other information released in the vicinity of the Exposure Draft publication date affected stock prices. Such price effects are generally caused by earnings, dividends, or stock dividend announcements. Accordingly, we eliminated from the initial list all firms which announced earnings, dividends, or stock dividends during the critical period surrounding the publication of the Exposure Draft: July 13, 1977 to July 22, 1977.[10]

The above elimination procedures reduced the initial list of firms to the final sample comprised of 49 full-cost and 34 successful-efforts firms.[11]

A difference between our sample and those used in the previous studies should be noted. While the Dyckman-Smith and the Collins-Dent samples included a considerable number of over-the-counter (OTC) traded stocks,[12] our sample was restricted to New York and American Stock Exchange firms. The reason for not including OTC firms in our sample was that the OTC market is much "thinner" (*i.e.*, has a lower volume of trading) than the major exchanges. This sparseness of trading will cause a serious problem when daily returns are examined, such as in the present study, since many OTC stocks experience days of no trading. In such cases, the relationship between these stocks and the market return, underlying the "market" model used to derive risk-adjusted returns, is nonsynchronous, potentially leading to a seriously misspecified market model.[13] Moreover, the quoted bid-ask OTC prices are only brokers' estimates rather than the result of market actions during days of no trading in the specific stocks. Indeed, there are practically no studies demonstrating the efficiency of the OTC market or examining the applicability of finance models (*e.g.*, the Capital Asset Pricing Model) to this market. For these reasons I decided against combining in the sample OTC firms with those whose stocks are traded on major exchanges.

Except for the OTC firms, the sample used in the present study overlaps substantially with that used by Dyckman and Smith. For example, about 70 percent of our FC firms were also included in the Dyckman and Smith sample. Collins and Dent's sample differs from mine because of both the inclusion of OTC firms and the exclusion of Canadian firms in their sample.

B. *The Data*

Daily closing stock prices for each sampled firm were collected for a 78-trading-days period, broken down into the following three subperiods:

Subperiod	*Dates*	*No. of Trading Days*
1. The "Pre-Announcement" period, used for estimating the "market model" parameters for each firm.	May 9–July 12, 1977	45
2. The Exposure Draft "Announcement" period.	July 13–July 22, 1977	7
3. The "Post-Announcement" period, used to examine the stability of parameters.	July 25–August 29, 1977	26
	Total	78

Daily closing prices were obtained from the *Daily Stock Price Record*, published by Standard & Poor's Corporation. The S & P 500 Composite Index was used as the overall market index, since it is the broadest-based index of stock prices. Stock prices for each of the 78 days for each firm were adjusted for dividends, stock dividends, and stock splits.[14]

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[10] This elimination was done by searching the issues of *The Wall Street Journal* on those days for earnings and dividend announcements. Only seven firms were deleted because of this exclusion rule.

[11] The list of firms in the sample will be made available upon request.

[12] For example, in Dyckman's study, 32 percent of the FC firms and 51 percent of the SE firms were traded OTC.

[13] For elaboration on these misspecifications, see Scholes and Williams [1976].

C. *The Models*

The basic model employed throughout this study was the following type of "market model," which is widely used in finance and finance-based accounting research.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \qquad (1)$$

where:

$R_{it} = \log_e(P_{it}/P_{i,t-1})$, the daily return on the stock of firm i, computed as the natural logarithm of the daily price change.[15]

$R_{mt} = \log_e(I_{mt}/I_{m,t-1})$, the daily return on the "market," computed as the logarithm of the daily change in the S & P market index (I_{mt}).

ε_{it} = a residual reflecting that portion of security i's return which varies independently of the market return, R_{mt}.

The major objective of this model is to classify events that affect a security's return into one of two categories: (a) Events that affect all securities in the market (*e.g.*, an increase in the inflation rate), which are reflected by the market return, R_{mt}; and (b) events which have an impact only on security i (*e.g.*, an earnings announcement or a change in accounting technique applicable to individual firms), which are reflected by the residual, ε_{it}. Accordingly, in examining the behavior of stock i's returns the market model, (1) permits us to abstract from the behavior of the market as a whole and to focus only upon that portion of the stock's return, ε_{it}, which reflects events particular to stock i. Given that we are interested in this study in the possible impact of the Exposure Draft on individual firms, we will focus in the following on the "individualistic" portion of the stock returns, ε_{it}.

Regression (1) was first run by means of ordinary least squares (OLS) over the Pre-Announcement period (45 days) in order to provide parameter estimates for the prediction of residuals during the Announcement period. However, a diagnostic check of the OLS residuals indicated the existence of a substantial autocorrelation in the residuals which has, in general, an adverse effect on the prediction.[16] In order to overcome the autocorrelation problem we used the Cochrane-Orcutt (CORC) procedure.[17] Inspection of the Durbin-Watson statistics indicated no residual autocorrelation in the CORC regressions. Specifically in the OLS regressions the estimated Durbin-Watson statistics fell outside the no-autocorrelation region for 11 SE and eight FC firms. In the CORC regressions, there was *no case* in which the estimated Durbin-Watson statistics fell outside the null hypothesis region, suggesting the absence of residual autocorrelation. The CORC procedure was therefore used in this study.

III. TEST PROCEDURES AND RESULTS

A. *Comparison of Predicted with Actual Returns During the Announcement Period*

The parameters of regression (1) were estimated for each firm over the Pre-

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[14] Data on dividends and splits were also obtained from S&P's *Daily Stock Price Record.*

[15] Recall that stock prices were already adjusted for cash dividends.

[16] The daily residual autocorrelation arises from the fact that only a few securities are traded so actively that prices are recorded almost continuously. Many securities are traded infrequently relative to the market index (nonsynchronous trading), resulting in the residual autocorrelation. For elaboration on this problem, see Scholes and Williams [1976].

[17] This procedure for alleviating the autocorrelation of residuals problem is described in most econometric texts; see, for example, Johnston [1972, pp. 262–66].

Announcement period. These estimates were then used to derive for each sampled firm predicted returns for the Announcement and Post-Announcement periods, using the actual market return during these periods. These predictions, conditional on the estimated regression coefficients and realized market data, were then compared with the actual returns of each firm during the Announcement and Post-Announcement periods to determine the residual (unexpected) returns, u_{it}. If there was no change in the level of returns during these periods relative to the Pre-Announcement period, then the distribution of residuals estimated for the Announcement and Post-Announcement periods, u_{it}, should not be significantly different from the distribution of ε_{it}. The u_{it}'s will therefore reflect the price reaction, if any, to the Exposure Draft announcement. These residual returns for the Announcement and Post-Announcement periods are defined as:

$$u_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}). \tag{2}$$

The residual returns were then summed for each day across firms yielding daily sample average residual returns.[18] Cumulative averages (*i.e.*, cumulating the daily average residuals over time) were also computed.

Figure 1 and Table 1 present the behavior of the average residual (risk-adjusted) returns of SE and FC companies over the Pre-Announcement (days −30 to −3), Announcement (days −2 to 4), and Post-Announcement (days 5 to 30) periods.[19] The Exposure Draft announcement day, July 18, 1977, is defined as day 0. Note the close similarity in the pattern of the average residual returns of the FC and SE firms during the Pre-Announcement period. In particular, the timing of the turning points of the two series is almost identical. This similarity breaks down during the Announcement period: While the average residual return of SE firms turns upward on days 0 and 1, the average residual of FC firms decreases sharply on days 0 and 1. Moreover, while the negative residuals of SE firms during the Announcement period were not particularly large relative to those of the Pre-Announcement period (the negative residuals in days −27 and −8 were larger than those of day 2), the negative residuals of FC firms on days 1 and 2 (−.0232 and −.0166) were substantially larger than any of the residuals during the Pre-Announcement period. On average, and adjusted for the overall market change, the price of FC stocks dropped by about 4.5 percent during the first three days of the Announcement period, while the price of SE stocks dropped by about one percent. These findings are consistent with the hypothesis that there was, on average, a price reaction of FC stocks to the release of the Exposure Draft.

Is it possible to associate other information items with the observed drop of FC stock prices? Examining the chronicle of events in the Appendix, we observe that on July 15, 1977 (day −1) there were two news items with potentially negative implications for the oil and gas industry (*i.e.*, the rejection of the gas deregulation proposal and the permit to the Interior Department to explore for oil). These news items might be associated with the decline in stock returns of both SE and FC firms on day −1. However, during the next three days, July 18, 19, and 20 (the Exposure Draft announcement day and the two succeeding days), in which the unusually large negative residuals occurred for the FC stocks, there were no

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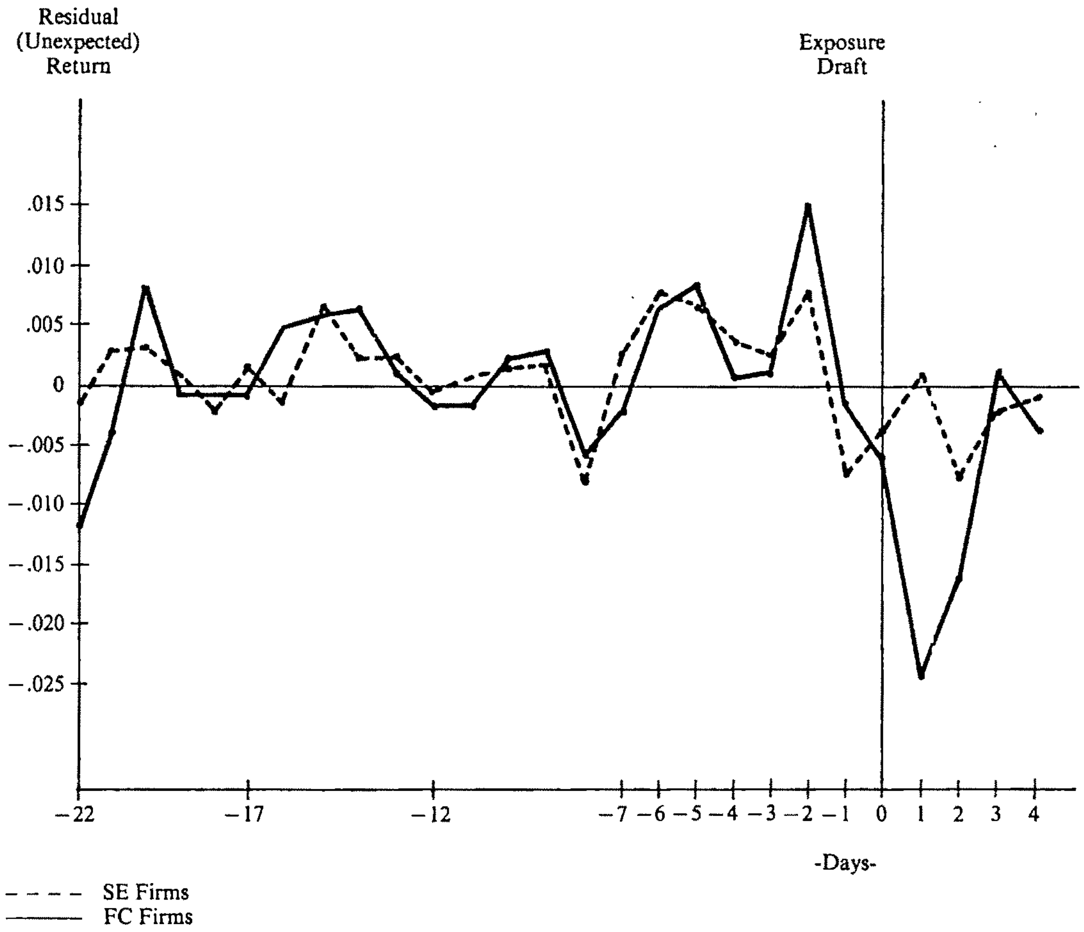
[18] It should be noted that these cross-sectional average residuals can be interpreted as the unexpected return in day t on an *equally-weighted portfolio* of the sampled stocks, given the market return.

[19] To save space, Figure 1 covers about one-half of the Pre-Announcement period and only the Announcement period. Also, the first 15 days of the Pre-Announcement period (days −46 to −31) are not reported in Table 1.

FIGURE 1

AVERAGE RESIDUAL RETURNS OF FC AND SE COMPANIES.



particular news items with negative implications for FC firms, except for the Exposure Draft. It appears, therefore, that the price decreases of FC stocks can be attributed to the Exposure Draft. Indeed. *The Wall Street Journal* in its July 20 issue noted that:

> Some of the oil and gas stocks were hit by news that the Financial Accounting Standards Board proposed that the nation's oil and natural gas producers use a "successful efforts" method of accounting for cost of searching for and developing oil and gas fields (p. 33).

Regarding the "permanency" issue, we observe in Figure 1 that on day 2 of the Announcement period the decreasing trend of FC stocks reversed itself and the average residuals were close to zero on days 3, 4, and 5 for both FC and SE stocks.[20] Recal that earlier studies on the Exposure Draft effect considered the

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[20] It should be noted that the fact that the average residual was close to zero during days 3, 4, and 5 means that oil and gas stock returns during these days were, on average, close to the overall market return. It does *not* mean that the loss suffered by stockholders during days 0 and 1 was compensated for.

TABLE 1

RESIDUAL RETURNS

	SE Firms		*FC Firms*	
Day	*Average Residual*	*Average Cumulative Residual*	*Average Residual*	*Average Cumulative Residual*
−30	.0008	−.0228	.0024	−.0128
−29	−.0047	−.0275	−.0044	−.0172
−28	−.0025	−.0300	−.0011	−.0183
−27	−.0080	−.0380	−.0044	−.0227
−26	.0015	−.0365	.0002	−.0225
−25	.0007	−.0358	.0057	−.0169
−24	.0012	−.0346	.0055	−.0114
−23	−.0011	−.0357	−.0038	−.0152
−22	−.0017	−.0375	−.0120	−.0272
−21	.0028	−.0346	−.0041	−.0313
−20	.0031	−.0316	.0083	−.0230
−19	.0007	−.0309	−.0001	−.0231
−18	−.0016	−.0325	−.0002	−.0233
−17	.0016	−.0309	−.0004	−.0237
−16	−.0010	−.0319	.0041	−.0196
−15	.0063	−.0256	.0059	−.0137
−14	.0028	−.0228	.0063	−.0074
−13	.0029	−.0198	.0015	−.0059
−12	−.0007	−.0206	−.0016	−.0075
−11	.0009	−.0197	−.0014	−.0089
−10	.0014	−.0183	.0022	−.0067
− 9	.0015	−.0169	.0025	−.0042
− 8	−.0079	−.0248	−.0056	−.0097
− 7	.0023	−.0226	−.0023	−.0120
− 6	.0075	−.0150	.0059	−.0061
− 5	.0071	−.0080	.0082	.0021
− 4	.0038	−.0042	.0002	.0023
− 3	.0018	−.0024	.0012	.0035
− 2	.0076	.0053	.0149	.0184
− 1	−.0070	−.0018	−.0016	.0167
0	−.0042	−.0059	−.0057	.0111
1	.0009	−.0051	−.0232	−.0121
2	−.0069	−.0119	−.0166	−.0287
3	−.0019	−.0138	.0005	−.0282
4	−.0011	−.0149	−.0037	−.0320
5	−.0033	−.0182	.0010	−.0310
6	−.0061	−.0243	−.0087	−.0397
7	−.0126	−.0369	−.0156	−.0553
8	.0025	−.0344	.0038	−.0515
9	−.0040	−.0384	−.0048	−.0563
10	.0009	−.0375	−.0048	−.0611
11	−.0030	−.0405	−.0026	−.0637
12	−.0031	−.0436	−.0042	−.0679
13	.0041	−.0395	.0034	−.0645
14	−.0017	−.0412	−.0020	−.0665
15	−.0017	−.0429	−.0020	−.0685
16	−.0022	−.0451	−.0046	−.0731
17	−.0063	−.0514	−.0035	−.0766
18	.0053	−.0461	.0074	−.0692
19	−.0041	−.0502	−.0032	−.0724
20	−.0067	−.0569	−.0086	−.0806
21	−.0009	−.0578	−.0087	−.0893
22	−.0063	−.0641	−.0028	−.0921
23	−.0041	−.0682	.0022	−.0899
24	−.0077	−.0759	−.0161	−.1060
25	−.0065	−.0824	−.0125	−.1185
26	−.0043	−.0867	−.0011	−.1196
27	−.0059	−.0926	.0005	−.1191
28	−.0062	−.0988	−.0064	−.1255
29	−.0036	−.1024	−.0022	−.1277
30	−.0002	−.1026	.0002	−.1275

price behavior over a long period subsequent to the Exposure Draft release. The daily residual behavior, on the other hand, suggests that the impact of the Exposure Draft was terminated after the third day of the Announcement period. This, of course, is consistent with the available evidence on capital market efficiency; in an efficient market, one would not expect the impact of a specific items of information to last more than a few days. The continuous downward shift of oil and gas stock prices subsequent to the Announcement period, which was observed in the previous studies, is also indicated in the current one. Practically all the average residuals in days 5 to 30 are negative, and the average cumulative residuals of both groups are continuously decreasing (see Table 1). It is, however, highly unlikely that these downward price shifts were associated with the Exposure Draft. It seems more plausible to attribute these downward shifts to other information items having negative implications for the oil and gas industry, such as the increase in the federal gasoline tax on July 20, 1977, or Exxon's earnings decline announced on July 25, 1977, which might suggest a trend for the whole industry. (See chronicle of events in the Appendix.)

So far in the analysis we have used "market model" (1) for deriving residuals and examining price behavior. At present there is only a little evidence supporting the adequacy of the market model for daily data. Indeed, the R^2s of model (1) for daily data are, in general, lower than those for weekly or monthly data: In our sample the average R^2s for the Pre-Announcement period were .17 and .12 for the SE and FC subsamples, respectively, while the typical values of R^2s for monthly returns are about .25. Given the potential estimation problems with the "market model" applied to daily data, we provide in Table 2 sample means and medians of the *raw* returns, R_{it}.[21] Results of the raw returns are generally consistent with those of the average residuals in Table 1. The mean and median returns of FC stocks for days 1 and 2 are negative and rather large (only the return on day 7 is larger), while the mean and median returns for the SE stocks in days 0 to 3 are not particularly large relative to the preceding and succeeding days. It appears, therefore, that the above findings are not model-specific.

Another issue raised by previous studies[22] concerned the effect of Canadian firms in the sample. It was argued that these firms should be excluded from the sample, given the uncertainty regarding the applicability of the FASB ruling to Canadian firms and the recent substantial oil findings of these firms. To examine the sensitivity of our results to this issue, we excluded all Canadian firms from our sample—four firms from the SE sample and 13 from the FC sample. The average residual returns of the remaining U.S. firms for the Announcement period are presented in Table 3. Comparison of these residuals with those of the full sample (Table 1) indicates only slight differences. The general behavior of residuals is practically unchanged by the exclusion of Canadian firms. Accordingly, the controversy over Canadian firms does not appear to be of significance to our results.

A final comment on the average residual behavior. While the proposed accounting change does not seem to affect SE firms, we nevertheless observe negative average residuals for these firms in each day of the Announcement period but one (day 1). This phenomenon might be due to the fact that the "successful

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[21] To save space, only about half the examined days are reported in Table 2.

[22] Collins and Dent, *op. cit.*

TABLE 2

SAMPLE MEANS AND MEDIANS OF RAW RETURNS

	SE Firms		*FC Firms*	
Day	*Mean*	*Median*	*Mean*	*Median*
−12	−.0049	−.0071	−.0072	−.0105
−11	.0018	.0000	.0009	.0000
−10	.0059	.0038	.0065	.0037
− 9	−.0001	.0000	.0014	.0000
− 8	−.0062	−.0036	−.0049	−.0038
− 7	−.0002	.0000	−.0048	−.0039
− 6	.0111	.0062	.0114	.0000
− 5	.0065	.0049	.0084	.0001
− 4	.0040	.0040	.0008	.0000
− 3	.0024	.0000	.0017	.0000
− 2	.0102	.0001	.0162	.0081
− 1	−.0148	.0040	.0039	.0001
0	.0044	.0068	.0030	.0000
1	.0092	.0076	−.0121	−.0087
2	−.0062	−.0048	−.0152	−.0072
3	−.0026	−.0020	.0002	.0000
4	.0010	.0000	.0009	.0001
5	−.0084	−.0101	−.0049	−.0043
6	−.0093	−.0106	−.0120	−.0107
7	−.0242	−.0202	−.0294	−.0234
8	.0051	.0040	.0070	.0000
9	−.0021	−.0036	−.0024	.0001
10	.0045	.0001	−.0004	.0000
11	−.0066	−.0068	−.0068	−.0052
12	−.0027	−.0020	−.0036	−.0002

TABLE 3

AVERAGE RESIDUALS DURING THE ANNOUNCEMENT PERIOD, EXCLUDING CANADIAN FIRMS

	Days						
	−2	*−1*	*0*	*1*	*2*	*3*	*4*
SE Firms	.0083	−.0089	−.0058	−.0014	−.0049	−.0019	−.0035
FC Firms	.0108	−.0059	−.0054	−.0219	−.0137	.0004	−.0037

efforts" version proposed in the FASB Exposure Draft is more strict from the point of view of expensing exploration costs than the successful-efforts versions currently used by many firms. Indeed, various SE firms noted in their financial reports (complying with the SEC Staff Accounting Bulletin No. 16) that the Exposure Draft will have an effect on their earnings and equity figures. Thus, for example, American Quasar Petroleum Co., an SE user, noted in its 10-K form (December 31, 1977):

> The Company is currently using a form of the "successful efforts" method of accounting as described above. Certain geological and geophysical costs (such as seismic and other similar interpretive expenditures) are pres-

> ently capitalized. . . . The change in accounting required by the standard is expected to cause a material adverse effect on reported net income and retained earnings.

Given the potential impact of the Exposure Draft on SE firms, some price reaction to the Exposure Draft release cannot be ruled out. This is consistent with the observed negative average residuals of SE firms during the Announcement period.

It should also be noted that the potential impact of the Exposure Draft on SE firms implies that this group cannot be regarded as an adequate "control group" against which to compare the "treatment group"—the FC firms. Accordingly, the benefits of statistical tests aimed at assessing the significance of the differences between the average residual returns on SE and FC stocks are questionable.[23]

B. *Disaggregation of the Sample: Significance Tests*

The behavior of the *average* residual and raw returns has been examined in the preceding subsection. Averages, however, might conceal important information in the sample distributions; in particular, they might be dominated by a few large residuals, thereby providing misleading information as to how *widespread* was the price reaction to the Exposure Draft information. In assessing the significance of the Exposure Draft impact, it is, therefore, imperative to disaggregate the sample and examine the price behavior of individual firms. One way of performing such a disaggregation is to determine *for each sampled firm* confidence intervals around the predicted returns during the Announcement period,[24] and then to evaluate the actual values of the returns during this period against the confidence intervals. If the downward revision of prices attributed to the release of the Exposure Draft was indeed an unusual and widespread phenomenon, one should observe a larger than expected-by-chance number of returns falling below the lower confidence interval.

The confidence intervals are determined by the standard error of regression prediction errors, $\sigma_{p\tau}$, defined as

$$\sigma_{p\tau} = \sigma\left[1 + \frac{1}{n} + \frac{(X_{t+\tau} - \bar{X})^2}{\sum_{t=1}^{n} (X_t - \bar{X})^2}\right]^{1/2}, \quad (3)$$

where:

σ = estimated standard error of the regression, run over the Pre-Announcement period;

n = 45, the number of observations in the Pre-Announcement period;

$X_{t+\tau}$ = market return for day $\tau = -2, \cdots, 4$, the Announcement period;

$\bar{X}$ = average market return during the Pre-Announcement period.

The confidence intervals are defined as:

$$\hat{R}_{t+\tau} \pm Z_{y\%}\sigma_{p\tau} \quad (4)$$

where:

$\hat{R}_{t+\tau}$ = predicted returns for each of the seven days of the Announcement period, and

$Z_{y\%}$ = the number of standard deviations for a standard normal population with $y\%$ confidence level.

Note that a confidence interval was computed for the return of each sampled

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[23] Such tests were performed in both the Dyckman-Smith and the Collins-Dent studies. These authors, however, were careful to warn the reader about the problems in regarding the SE firms as a perfect control group.

[24] Recall that these predictions were based on the regression parameters estimated over the Pre-Announcement period and on the realized values of the index (market returns) during the Announcement period.

TABLE 4

NUMBER OF FIRMS WHOSE RETURNS FELL BELOW THE LOWER CONFIDENCE INTERVAL
(Percentages of Total Sample in Parentheses)

Sample Subgroups		*Days of Announcement Period*						
		−2	*−1*	*0*	*1*	*2*	*3*	*4*
90 Percent Confidence Intervals	SE	0 (0)	3 (8.8)	3 (8.8)	1 (2.9)	5[b](14.7)	1 (2.9)	2 (5.9)
	FC	1 (2.0)	5[a](10.2)	4 (8.2)	11 (22.4)	9 (18.4)	2 (4.1)	2 (4.1)
95 Percent Confidence Intervals	SE	0 (0)	3 (8.8)	1 (2.9)	0 (0)	4[b](11.8)	0 (0)	2 (5.9)
	FC	1 (2.0)	2[a](4.1)	3 (6.1)	7 (14.3)	6 (12.2)	1 (2.0)	3 (6.1)

[a] Coastal States Gas Corp., an FC firm, had in day-1 a negative return which fell below the 90 percent and 95 percent confidence intervals. However, this observation was not included in the table since on this day (July 15, 1977) *The Wall Street Journal* carried a news item with possible negative implication for Coastal Corp.; see the chronicle of events in the Appendix.

[b] Atlantic Richfield, an SE firm, had in day 2 a negative return which fell below the 90 percent and 95 percent confidence intervals. However, this observation was not included in the table since on this day (July 20, 1977) *The Wall Street Journal* announced that the Alaska pipeline was closed, and Atlantic Richfield has a significant interest in this pipeline.

firm[25] for each day of the Announcement period.

Table 4 presents for each day of the Announcement period the number of firms whose actual returns fell below the lower confidence interval.[26] Such a deviation from the lower confidence interval indicates an unusually large negative return, relative to the normal behavior of returns during the Pre-Announcement period. Accordingly, this suggests a response of stock prices to the release of the Exposure Draft. We first observe that for both the 90 percent and 95 percent confidence intervals, a larger than expected-by-chance number of deviations from the confidence intervals occurred only on days 1 and 2 of the Announcement period. In the remaining days the number of deviations from the lower confidence interval was roughly that expected by chance. This is consistent with the large negative residuals in days 1 and 2 in Table 1. For SE firms there was a slightly higher than expected-by-chance number of deviations in day 2. However, for FC firms the negative price revision was more widespread. In day 1, for example, almost one-quarter of the sampled firms experienced negative residual returns falling below the 90 percent confidence interval. Thus, it appears that the release of the Exposure Draft was associated with a moderate across-the-board price revision, affecting in a significant manner rougly one-fifth to one-quarter of the FC firms.[27]

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[25] For simplicity of exposition, a firm subscript was deleted from expressions (3) and (4).

[26] Note in the footnotes to Table 4 the exclusion of two firms due to news items with potential negative implications.

[27] It can be argued that the proposed change in accounting method might have also affected the basic relationship between the individual stock returns and the market's rate of return, postulated by model (1). For example, one can argue that the higher volatility of earnings to be induced by the proposed switch form FC to the SE method will affect the riskiness of the stock as perceived by investors and, therefore, might be reflected in a larger β coefficient (systematic risk) in model (1). To examine this issue we have compared the parameters of regression (1) run over the Pre-Announcement period with those run over the Post-Announcement period. A significance test of the stability of parameters (an *F*-test described in Kmenta [1971, pp. 373–74]) indicated that the firm-market relationship in the Pre-Announcement period remained, for the large majority

IV. INTERPRETATION OF RESULTS AND CONCLUDING COMMENTS

The tests described above suggest that the release of the FASB Exposure Draft on July 18, 1977, was associated with a downward revision of stock prices of oil and gas producers, particularly those using the FC method. For FC firms, on average, the cumulative market-adjusted price decrease during the Announcement period was about 4.5 percent, and significantly affected about 20 percent of the sampled firms.[28] It appears, therefore, that the release of the Exposure Draft had a moderate effect on the capital market.

It should be noted that the total market impact of the Exposure Draft was possibly more pronounced than that revealed by the tests conducted above, due to anticipation of the Draft's content by the market. Specifically, if the Exposure Draft's content was anticipated before its release, some of the market impact would have been reflected in the Pre-Announcement stock returns, and only the unanticipated portion of the Draft would have been reflected in the Announcement period returns. However, the almost identical behavior of SE and FC residuals during the Pre-Announcement period (Figure 1) suggests that the Exposure Draft was not anticipated by broad segments of the market. Had the Exposure Draft been anticipated, one would have expected to observe differences in the residual behavior of SE and FC firms during the Pre-Announcement period, given the differences in the implications of the Exposure Draft for the two groups of firms. Such differences indeed occurred during the Announcement period. It appears, therefore, that the Exposure Draft content was not anticipated in a major way.

The price decline of FC stocks cannot be ignored by policy makers in assessing the market consequences of the proposed accounting switch, especially since it was triggered by an exposure draft only, as the final decisions of the FASB and the SEC were not yet known, and as the exact effect of the accounting switch on the financial statements of individual firms could not be fully assessed.

The observed price revision is somewhat surprising, given the strong evidence on capital market efficiency and the evidence on investors' ability to distinguish between accounting changes which have substantive economic effects on cash flows (*e.g.*, a change from FIFO to LIFO, due to the tax consequences) and those that have no substantive implications. The proposed change from FC to the SE method appears to belong to the latter category; no substantive economic effects are expected from such a switch. A question is therefore raised as to why did we observe a downward price revision of FC stocks during the announcement period. Several possible answers come to mind.

1. For some FC firms (and to a much lesser extent for SE firms), the proposed accounting change might have had a *real* effect on the ability of the firm to comply with debt covenants, such as those involving the debt/equity ratio. Specifically, a switch from FC to SE will, in general, require an investment write-off and will therefore reduce the firm's equity and increase the debt/equity ratio. Indeed, in a survey conducted by the FASB of firms' disclosure concerning the potential impact of the switch to the

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of the firms, unchanged during the Post-Announcement period.

[28] Tests on the effects of the Exposure Draft on the volume of trade of oil and gas firms were also conducted. There appeared to be no volume effect associated with the Exposure Draft release.

SE method, six FC users out of 92 oil and gas producers stated that existing debt and other agreements will or may require renegotiation [FASB, 1978].

2. For some firms the switch to the proposed form of the SE method might have had a real impact on dividend policy. Presumably, the higher volatility of earnings resulting from the SE method might induce management to decrease the payout ratio so that future dividends would not have to be substantially decreased during periods of losses from explorations. In the FASB survey mentioned above [FASB, 1978], seven out of 76 firms stated that future dividend policy may be affected by the accounting change.
3. Some downward revision of stock prices might have resulted from investors' response to claims by executives of several FC firms and by others that the switch of accounting method would affect the scope of future explorations.[29] Specifically, it has been argued that the strict requirement under the FASB form of the SE method to expense all cost of unsuccessful explorations might deter management from engaging in high-risk explorations. Obviously, if such a change in management policy materializes, it would have a real effect on the cash flows of some oil and gas producers.
4. The proposed accounting switch could have had a real economic impact on the operations of FC firms if management compensation systems were to include incentive provisions based on *reported* net income. Given that the switch in accounting method will probably affect reported net income, managers can be expected to change operational decisions (*e.g.*, drilling activity) in an attempt to maximize their compensation.
5. Lastly, despite some evidence to the contrary, one can never preclude the possibility that investors react to changes in the properties of accounting numbers (*e.g.*, their variability), even when such changes are not associated with substantive economic effects.[30] If such a reaction occurs in the market, it can explain the impact of the Exposure Draft announcing a proposed switch of method with potential impact on the properties of accounting numbers.

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[29] For example, John Chalsty, Managing Director of Donaldson, Lufkin and Jenrette Securities Corporation, in testimony at the DOE hearings, stated:

> [Successful] efforts accounting will bring about a significant reduction in the reported earnings of most Full Cost exploration-oriented companies and a significant increase in the volatility of such earnings. It is our contention that this combination will adversely affect investors' appraisal of these companies; this in turn will impair the companies' access to the equity capital markets and finally reduce and concentrate the exploration function as smaller independent companies either withdraw from this high risk effort or merge with larger entities more able to absorb the earnings fluctuations.

[30] Arguments in the "income smoothing" controversy discussed in the accounting literature are often based on the belief that investors react to the variability of income numbers.

APPENDIX

Chronicle of Events Surrounding the Exposure Draft Announcement Period[a]

Date	*Event*
July 11, 1977	1. An article on the President's energy package sounding optimism about quick legislation. Specific points: the federal gasoline tax is expected to be boosted, the President will obtain a broad authority to ration gasoline, a gas-guzzling tax will be levied, and utilities and industrial users of oil and gas will be forced to convert to coal.
	2. A news item about Secretary Schlesinger's television announcement that some form of oil and gas rationing is under consideration by the White House.
	3. Alaska oil pipeline has been closed due to an explosion.
	4. Mountain Fuel Co. charged by the Federal Power Commission for violating the Natural Gas Act.
July 12, 1977	1. An article on an OPEC meeting which is expected to increase prices of heavier Saudi crude oil.
	2. The Interior Department ordered the Alaska pipeline kept closed pending a federal inquiry into the explosion and fire.
	3. Editorial on the energy program expressing the opinion that the administration will succeed in getting major parts of the program through Congress.
	4. An article about expected increases in second-quarter earnings of oil and gas companies.
	5. Southern Union Co. received a $7.1 million annual rate increase.
	6. Wainoco Oil plans a $10 million public offering of convertible subordinated debentures for debt repayment and oil and gas exploration.
	7. Atlantic Richfield introduced a new motor oil enriched with graphite.
July 13, 1977	1. Substantial portions of the energy bill cleared the House Commerce Committee.
	2. Report on a world-wide glut of heavier types of oil.
	3. Editorial attacking the White House for not pushing for deregulation of natural gas, and estimating that this failure will cost the economy $48 billion between now and 1990.
	4. Buttes Gas Co. disclosed $75,000 in payments to foreign officials.
July 14, 1977	1. OPEC talks end without settling issue of heavier crude.
	2. Phillips Petroleum Co. halted production in the North Sea.
	3. Marathon Oil Co. announced oil finding in the North Sea.
July 15, 1977	1. A lead article about the vote in the Commerce Committee rejecting a proposal to deregulate gas prices. This is regarded as a considerable blow to gas producers lobbying heavily for deregulation.
	2. A setback to the oil industry brought about by a Senate vote (52 to 46), allowing the Interior Department to explore the federally-owned outer continental shelf. This vote reversed an earlier decision by the Senate Energy Committee.
	3. News on world-wide oil glut.
	4. Out-of-court settlement for Coastal States Co. on a $1.6 billion lawsuit.
	5. Sohio Co. settled an antitrust lawsuit.
July 18, 1977	1. An article on an administration-backed bill rewriting federal rules for off-shore oil leasing, which is intented to promote more competition in the industry. The bill is moving well along in Congress.
	2. An article saying that Congress's Office of Technology Assessment is pessimistic about the prospects for recovery of hard-to-get oil and natural gas.
	3. Continental Oil Co. announced award of a $69 million contract for off-shore oil production platform.
	4. House Committee vows to finish work on energy package within one week.
	5. Sun Co. is undergoing restructuring designed to make it less dependent on oil reserves.
	6. Buttes Gas Co. offers $40 million debentures and 200,000 new common shares.
July 19, 1977	1. Denouncement of the President's energy program (". . . it would not do the job.").
	1. Alaska pipeline cleared to resume oil flow.
	3. Phillips Petroleum Co. resumes production in North Sea.
July 20, 1977	1. Article on the FASB Exposure Draft stating, among other things, that "Share prices of some oil companies, mainly smaller ones, fell in trading yesterday after the FASB disclosed its proposal" (p. 8). The article reflects the concern of FC users.
	2. Alaska pipeline closed as vehicle strikes valve.
	3. McCulloch Oil Co. to expedite its withdrawal from land development operations.
July 21, 1977	1. House Energy Committee voted a four-cent increase in federal gasoline tax.
July 22, 1977	1. Article about a compromise in the House on the energy bill with which oil industry lobbyists are not pleased.
	2. Noting that prices of some oil stocks hurt this week by the Exposure Draft rebounded.
	3. Fluor Corp. awarded a $70 million contract.
July 25, 1977	1. The House seems likely to give President Carter a fairly sizable chunk of his energy package. Committee approves tax on industrial use of oil and gas.
	2. Exxon's earnings decline by 3.4 percent in second quarter. Six-month net income decreased by 7.9 percent.

[a] Source: *The Wall Street Journal,* issues from July 11, 1977 through July 25, 1977.

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The Costs and Benefits of Cost Allocations

Jerold L. Zimmerman

ABSTRACT: This paper raises the often-ignored, positive question of why firms continue to allocate costs for internal reporting purposes in spite of educators' continual admonitions to the contrary. Two examples are constructed. These cases illustrate that cost allocations can act as a lump-sum tax which reduce the manager's consumption of perquisites and that cost allocations can serve as useful proxy variables for certain difficult-to-observe costs. These examples suggest that cost allocations might be useful devices for controlling and motivating managers.

COST allocations has been a pervasive topic in the accounting literature for over 75 years.[1] Usually, cost allocations are discussed within the context of inventory costing and pricing decisions. However, the allocation problem also arises under the guise of transfer pricing, divisional performance evaluation, and line of business reporting. The issue of cost allocations is a principal concern of the Cost Accounting Standards Board (CASB).[2]

The prevailing views of most accounting researchers vary from the position that the determination of how to allocate costs is essentially an arbitrary decision to the view that cost allocations are so highly firm-specific that no general rule can be determined.[3] For example, Dopuch [1977, p. 81] claims that "practically every cost accounting text stresses the arbitrary nature of many cost allocations. . . . " Kaplan [1977, p. 52] goes further and asserts that "[m]any accountants and almost all economists argue that any allocation of joint costs (including overhead and depreciation over time) is arbitrary and serves no use-

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[1] Solomons [1968] describes the early development of cost allocations. In addition the following references are illustrative of the later literature: Clark [1923], Vatter [1945], Brummet [1957], Thomas [1969], Fekrat [1972], Hart [1973], Moriarity [1975], Hamlen, *et al.* [1977].

[2] Of the first six standards promulgated by the CASB since its inception in 1970, three dealt directly with cost allocations and the other three were indirectly related. See Joint Financial Management Improvement Program [1974].

[3] See Thomas [1971], Dopuch, Birnberg, Demski [1974, p. 32], and Horngren [1977, p. 508].

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ful purpose." Some researchers even take the rather novel position of not advocating cost allocations while they simultaneously introduce a new technique by which costs can be allocated.[4] Except for inventory valuation for financial and tax reporting, government contracting, ratesetting, cost documentation for possible antitrust suits (*e.g.*, the Robinson-Patman Act), or cost-plus pricing, the accounting literature generally recommends avoiding cost allocations.

The general thrust of the vast majority of the literature generically labeled "cost allocation" is predominantly normative. The literature is aimed at prescribing how firms should or should not allocate costs. Accounting researchers typically ignore the positive question[5] of why firms persist in allocating costs in spite of the continual admonitions by educators against doing so.

This paper addresses this positive question. It identifies some plausible reasons why rational, maximizing individuals would want to allocate costs. Other authors have noted possible benefits from the allocation of costs. Horngren [1977, p. 508], for example, concludes:

> Whether to include uncontrollable or indirect costs is a difficult question, which must ultimately be resolved in terms of how the given alternatives *influence management behavior* in a particular organization. In one organization, allocation may be desirable because it induces the desired behavior. In another organization, the same allocation procedure may cause an opposite behavioral effect (emphasis in original text).

Kaplan [1977, pp. 52–53] also recognizes the schism between practice and theory:

> A desire for cost allocations . . . must arise because of decentralization. . . . One approach that might prove interesting is to assume that central management has a simple, but not complete, representation of the production and sales opportunities available for each of its divisions or product lines. . . . One would hope to be able to show that the solution arrived at by the local managers incorporating the allocated costs is superior to the solution which they would have obtained in the absence of any cost allocations.

Notice that both Horngren and Kaplan believe that cost allocations are linked to managerial behavior. That is, managers will behave differently if costs are allocated. This paper provides some concrete examples and sufficient conditions which support Horngren's and Kaplan's conjectures. Two cost-allocation situations and the associated costs and benefits are described: controlling a manager's discretionary spending on perquisites and rationing an internal service (*e.g.*, a payroll department). An analysis of these situations shows that cost allocations, managerial behavior, and the structure of the organization, including the incentives facing the managers, are inextricably linked. This suggests that in practice cost allocations are used, at least in part, to solve certain organizational control problems.

Furthermore, this paper demonstrates that situations exist in which cost allocations yield positive net benefits to the firm. Clearly, in such cases, cost allocations are not arbitrary decisions, and the myth should be dispelled that a firm's allocating costs for internal purposes is *prima facie* evidence of irrational behavior.

The paper consists of three sections.

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[4] For example, Kaplan and Welam [1974, p. 478] state: "[T]his paper should not be construed as a defense for allocating traditional overhead costs to goods. Rather, it provides methods so that, if management *wants* to allocate traditional overhead costs to goods, the relative profitability of the goods is not distorted" (emphasis in original text).

[5] See Jensen [1976]. Such a positive approach has been applied to several financial accounting topics, see Benston [1975], Watts [1977], and Watts and Zimmerman [1978].

Section I is mainly pedagogic, showing how a firm's organization can be conceptualized as a complex of interacting, self-interested agents, and how Williamson's ideas [1964] of using a tax scheme to drive an agent to reduce discretionary spending carries over to cost allocations achieving similar ends in the firm. Section II analyzes cost allocations in a product costing situation, thereby illustrating the rationality of such practices. Section III concludes the study with a brief summary of the main arguments of the paper, and indicates directions for further research.

I. COST ALLOCATIONS AND THE AGENCY PROBLEM

Whenever one person (the principal) engages another person (the agent) to perform some tasks on his behalf, an agency problem exists.[6] If all individuals are assumed to be resourceful, evaluative, maximizing men (or REMMs),[7] we would expect (as should the principal) that the agent will try to improve his welfare by engaging in activities which are not necessarily in the principal's best interest (*e.g.*, shirking, on-the-job leisure, consumption of perquisites, theft).[8] The principal can install monitoring devices (*e.g.*, security guards, auditors, time clocks, supervisory personnel) and incentive schemes (*e.g.*, piece rates, bonuses, promotions) to discourage the agent from selecting actions which increase the agent's welfare at the principal's expense. Likewise, the agent can enter into contracts (bonding arrangements) which reduce the likelihood of his choosing actions which harm the principal, or which compensate the principal if those actions are selected. However, since bonding and monitoring are costly, we expect the agent, even given optimum levels of bonding and monitoring, to select some actions which reduce the principal's welfare. The dollar-value equivalent of the reduction in the principal's welfare is defined as the "residual loss" by Jensen and Meckling [1976, p. 308] and comprises the third component of agency costs (the other two are monitoring and bonding costs).

The firm can be conceptualized as a series of agent-principal relationships. Jensen and Meckling [1976] analyze the agency problems which exist among the various classes of capital holders and management, where management is assumed for purposes of their analysis to be either a single individual or a homogeneous group. However, their theory applies as well to subordinate-superior managerial relationships within the firm. The divisional vice president, for example, is faced with an agency problem since the subordinate manager can divert resources by shirking and by expending firm resources to improve his working conditions (*e.g.*, thick carpets, air conditioning, congenial employees) beyond the level that maximizes the superior's welfare. The principal (or superior) attempts to structure a system of incentives to induce the agent to choose actions which maximize the principal's welfare. Given the incentive and monitoring structure faced by the superior (*i.e.*, each superior is also an agent) the superior's welfare usually depends in part on the agent's productivity, the agent's compensation, and the agency costs associated with the superior-subordinate relationship. The internal accounting system in general and cost allocations in particular affect these agency costs in the following manner.

Consider a firm using responsibility centers where superiors use the formal reporting system to assess their subordinates' performance, and this assessment affects the subordinate's compensation.[9] Managers of these centers are given budgets and objectives. Their welfare depends on their ability to manage the resources at their discretion to achieve these objectives. The manager of the responsibility center derives utility not only from pecuniary compensation but also from non-pecuniary factors. The size and decor of the manager's office, the number of subordinates reporting to the manager, the number of hours he works, *etc.*, are typical non-pecuniary items which enter into the manager's utility function. The manager is usually given the discretion to decide how much to spend on these and the other input factors of production within his responsibility center. If the manager's utility function depends only on pecuniary compensation, which is a function of his performance to achieve the stated objectives, then the manager will select the level of each factor of production which maximizes his center's and hence the firm's (and his principal's) objective function. But if the manager's (the agent's) utility function also depends on non-pecuniary items, and if the manager cannot replicate these outside the firm, then he will substitute some of his center's output (or profits) for additional perquisites (*i.e.*, the agent will "overconsume" certain inputs).[10]

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[6] Jensen and Meckling [1976].

[7] Meckling [1976].

[8] Alchian and Demsetz [1972] and Williamson [1964].

For example, suppose a one-period world and let the curve denoted ABCD in Figure 1 be the production possibility frontier between the reported responsibility center's profits and dollars of a given factor of production that the manager also values as a perquisite (*e.g.*, computer utilization). Holding all other factor inputs constant, firm profits rise as the first dollars are spent on this input (*i.e.*, marginal cost is less than the marginal value of the product), but subsequently total profits fall since the marginal cost exceeds the marginal value of the product. The center's profits are maximized by spending E^* on the perquisite. Since the manager is assumed to receive non-pecuniary income from this factor input (*i.e.*, his utility function has two arguments, center profits and this factor input), his indifference curves are represented by I, I', and I''. If there are perfect substitutes for perquisites outside the firm which the manager could purchase dollar for dollar, then the indifference curves would be straight lines (ignoring taxes). But as long as the manager cannot spend corporate resources on anything he wants or cannot "steal" resources, the indifference curves are convex towards the origin.[11] Such a manager will not select the center's profit maximizing level of perquisites (*e.g.*, E^*), but rather will trade off some profits for additional perquisites by selecting point C where $E > E^*$.

The exact shape of the indifference curves in Figure 1 depends on the trade-offs perceived by the individual manager. Impounded into the indifference curves is the incentive compensation plan (*i.e.*, the formula defining the manager's share of the division's profits). Furthermore, the analysis assumes there are no trading opportunities arising from the differential tax treatment of the corporation and manager. Mathematically, the utility function, U, has two arguments, division profits, π, and dollars of perquisites, E, and $U(\pi, E)$ displays a diminishing marginal rate of substitution between E and π as E increases.[12]

The principal has at his disposal numerous monitoring and incentive de-

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[9] See Benston [1963] pertaining to this assumption.

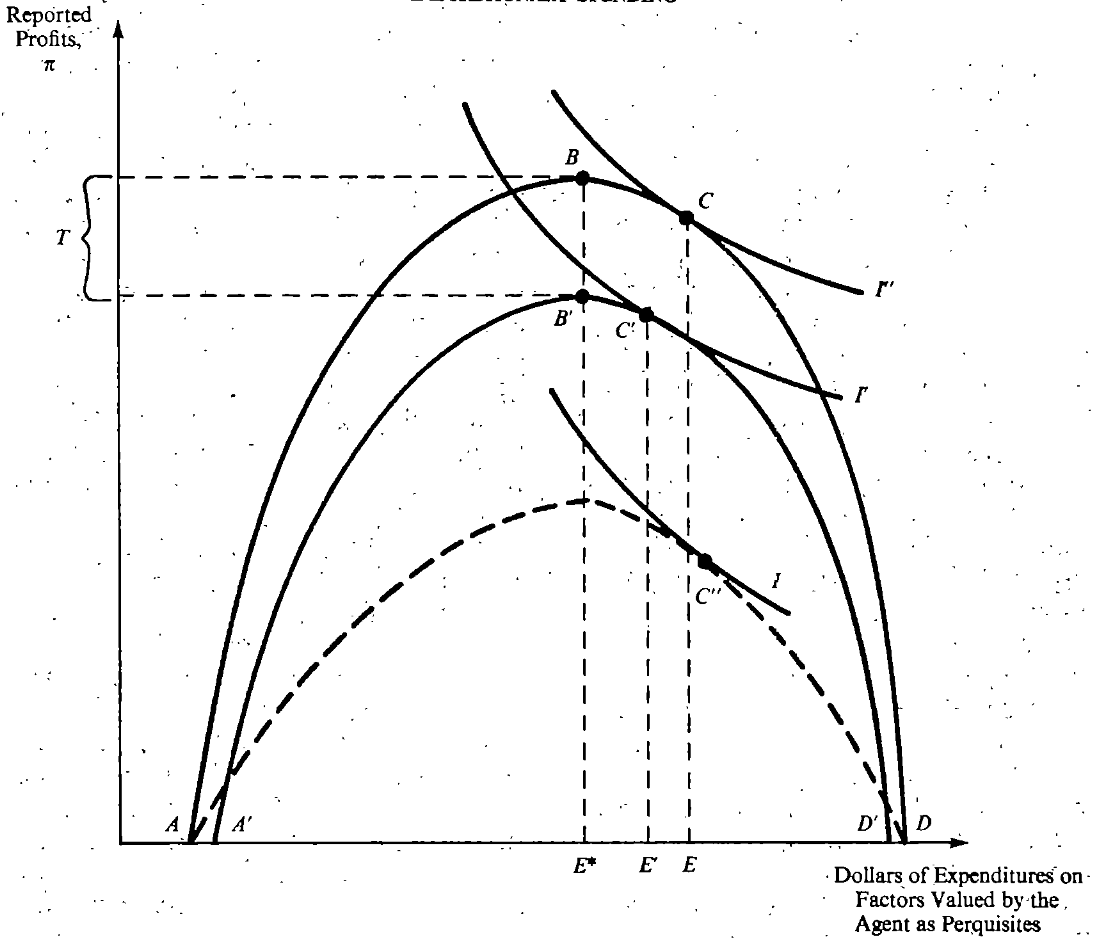
[10] Williamson [1964].

[11] Jensen and Meckling [1976, p. 316].

[12] For the indifference curves in Figure 1 to be convex a sufficient condition in the two-good case (E and π) is that the marginal utility of each is positive but drecreasing, as E increases and the cross-partial, $U_{E\pi}$, is zero.

FIGURE 1

OVERHEAD AS A LUMP-SUM TAX TO REDUCE DISCRETIONARY SPENDING



vices to control the agent's overconsumption of perquisites including direct observation, formal reporting schemes, competition among subordinates, *etc.* However, since all these monitoring devices are costly, they will only be used up to the point that marginal costs and benefits are equated. Although the principal can reduce the agent's overconsumption from what it would be in the absence of any monitoring, it is unlikely that all of the overconsumption will be eliminated.[13] Since the firm is already calculating cost allocations for tax and external reporting purposes, the additional bookkeeping costs of reporting these allocations internally are minimal. The question is, can cost allocations further reduce the overconsumption of perquisites?

Williamson [1964, Ch. 4] established

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[13] In particular, unless the monitoring cost functions are such that a corner solution results (*i.e.*, all perquisite overconsumption is eliminated), monitoring will proceed to where marginal costs and benefits are equated, which need not be where overconsumption is eliminated.

that under certain assumptions, an agent's discretionary spending on perquisites can be reduced by a lump-sum tax. Cost allocations can act as a lump-sum tax. Refer again to Figure 1. Assume that home office expenses are allocated to responsibility centers. In effect, the principal is "taxing" the responsibility center by allocating \$*T* of the principal's overhead to the responsibility center. The responsibility center manager faces a new opportunity set, $A'B'C'D'$. ($A'B'C'D'$ is a vertical downward shift in *ABCD* by \$*T*.) The new optimum level of perquisites (from the agent's perspective) after the allocation of \$*T* is C', and the level of perquisites is reduced from *E* to E'.[14]

If the tax (or allocation scheme) is tied to profits, the analysis becomes more complex. Williamson [1964] demonstrates that a tax tied to profits leads to an indeterminate effect on the manager's discretionary behavior (*i.e.*, the direction of the effect depends on the substitution and income effects) and hence, additional assumptions must be made if cost allocations are to reduce perquisite consumption. The dashed curve $AC''D$ is generated if overhead is allocated based on profitability (*i.e.*, $AC''D$ is $(1-t)$ times *ABCD* where $0<t<1$ is the overhead rate on center profits). In this example, the quantity of perquisites chosen actually increases.

Williamson's analysis provides a plausible reason as to why, in practice, noncontrollable costs are allocated to managers (*i.e.*, to reduce their consumption of perquisites). However, using Williamson's model in the cost-allocation context has some shortcomings. If the principal is using overhead as a tax to reduce perquisites, why not set the tax equal to total expected profits, thereby driving the agent to E^*? This is not done because, unless the agent is receiving wages and perquisites at least equal to his next best employment alternative, he will leave the firm. Williamson's analysis ignores equilibrium in the labor markets (*i.e.*, $U=U^0$, where U^0 is the agent's opportunity utility). Also, it does not include alternative (costly) monitoring schemes and the tradeoff among the alternatives. Although Williamson's model has faults, it does raise an interesting, possible beneficial role of cost allocations.

Several testable implications are suggested by this agency cost model. First, cost allocations are more likely in situations when other monitoring costs are high, for example, where the agent and principal are geographically dispersed. Since the costs of direct observation by the principal are higher when the agent and principal are geographically separated, there is greater expected overconsumption of perquisites. Accordingly, cost allocations, to the extent that they reduce the overconsumption problem, are more likely to be used. Second, since a proportional tax (*e.g.*, an overhead scheme tied to profits) can cause the agent actually to increase his overconsumption of perquisites, we should observe fewer such schemes than of the lump-sum overhead allocation variety.

Cost allocations also can reduce the agency costs associated with perquisite consumption by inducing the subordinate to act as a monitor of his superior. By allocating the superior's expenditures to the subordinate, incentives are created for the subordinate to monitor these expenditures, since his welfare is now affected by his superior's overconsumption of perquisites. The subordinate is indirectly the agent of his superior's principal, and, through the allocation process, bears some of the cost (in terms of his welfare) of the superior's expenditures. Since the subordinate is evaluated against other department managers on the basis of, in part, internal accounting statements employing allocated costs, the subordinate's future promotions are negatively affected by his superior's excessive consumption of perquisites.[15] As the superior's decisions start to impinge on the subordinates' welfare, the subordinates either try to convince their superior to eliminate the wealth-reducing expenditures or they go directly to their superior's principal.

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[14] This result depends on the sign of the rate of change of the marginal rate of substitution between perquisites and profits. If perquisites are normal goods, then a lump-sum tax on profits results in a new tangency moving in the southwest direction.

The subordinate will by-pass his superior only if the expected benefits (*i.e.*, the increased chances of promotions by either disclosing his superior's indulgences or having larger discretionary profits) outweigh the costs which the subordinate will incur from such monitoring activities. Overhead allocations create incentives for the subordinate to monitor his superior's expenditures since his own welfare is affected. In addition, if the subordinate has access to local information and can specialize regarding his department's production process, then he may be the minimum-cost monitor of his superior.

The purpose of the preceding discussion is *not* to derive optimum allocation schemes or to present a complete formal model of the problem, but rather to suggest a possible benefit of allocating costs and to stimulate further work in the area. The Williamson model should be expanded to include income tax effects, incentive compensation plans, competition in the market for managers, *etc.*[16]

II. MANUFACTURING OVERHEAD COSTS

This section analyzes cost allocations in the typical product costing situation. But before discussing manufacturing overhead costs, some prefatory comments are in order.

A. Cost Allocations as Proxies for Externalities Arising from Decentralization

First, in this section, the overconsumption-of-perquisites problem (previously discussed) is ignored.

Second, to illustrate the central theme of this section, consider the following simplified example. The firm leases from the telephone company a WATS (Wide Area Telephone Service) line for $3800 per month, expecting to use the line 100 hours per month. This service allows the firm unlimited toll-free long distance calls within the United States. Although each individual long distance call is not billed by the phone company, only one call at a time can be placed. The $3800 is a "fixed" cost; the "variable" cost of a call is zero. Should the firm allocate this $3800 internally among the users?

One argument goes that the cost should not be allocated, for any charge will discourage use and since the marginal cost is zero, the value of the resource is not being maximized. However, the "correct" marginal cost (*i.e.*, the opportunity cost) of using the resource is not zero. It equals the cost imposed by forcing others who want to use the WATS line to either wait or place a regular toll call. Hence, the correct price to charge is the cost which the user imposes on others by tying up the scarce resource. But this cost varies between zero (if no one is delayed) to, at most, the cost of a regular toll call if a user cannot use the WATS line. This cost changes from instant to instant throughout the day. To measure it exactly is not easy,[17] requiring either a real-time information system or a sophisticated statistical analysis of hourly arrival rates, distribution of calls, *etc.* Both of these solutions are costly. An alternative to either charging a zero price or charging a price based on an elaborate (costly) system is to charge $38 per hour (*i.e.*, a constant price based on the full allocated cost of the $3800 divided by the expected utilization of 100 hours). A side benefit of such a full-cost allocation is that information is generated regarding the value of the service. If more than $3800 in overhead is absorbed, the purchase of an additional WATS line should be investigated. If less than $3800 is absorbed, then discontinuance of the service might be warranted.

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[15] Even if his future promotion is not affected by the superior's excessive spending, he still has incentive to monitor his superior if the subordinate is forced to reduce his consumption of perquisites because his department is charged for his superior's consumption of perquisites via cost allocations.

[16] Here, the papers by Berhold [1971], Ross [1973, 1974], Jensen and Meckling [1976], Demski and Feltham [1978], and Kanodia [1978] should prove useful.

[17] See Dolan [1977].

The major points of this example are:

1. there are costly-to-observe nonzero opportunity costs (or externalities) associated with resource utilization within the firm;
3. cost allocations can proxy these opportunity costs; and
3. cost allocations can be the optimum pricing scheme for internal resource utilization, given the costs of implementing and operating alternative systems.

These opportunity costs can take one of at least three forms:

1. One user's use of a resource causes other users to wait, thereby forcing them to incur delay costs. The sum of these delay costs is a measure of the opportunity cost of utilizing the resource. Batch-operated computer systems, maintenance shops, and typing pools are all examples where delay costs are generated.

2. Degradation of service (*i.e.*, turnaround time or quality) to other users can often result when a "fixed" resource is shared. Supervision is an example. As the number of workers being supervised rises, holding the number of supervisors fixed, each worker's average (and marginal) productivity is likely to fall. Hence, there is a degradation of service. A new supervisor is hired when the cost of the new supervisor is less than the value of the degradaion. This suggests that certain step-costs do not really follow steps. Although the *reported* cost of the resource follows a step function, as in Figure 2, the *total* cost, including the degradation in in service (the dashed line, ABC), which need not be linear, is not a step function. The dotted portions represent degradation costs in excess of the costs of an added supervisor. Degradation costs are often found in time-share computer systems.

3. As service is degraded, queues develop, users seek alternative solutions, often purchasing additional resources external to the firm. If the backlog at the central computer facility forces a user to incur delay costs, as soon as these delay costs exceed the user's cost of the next best alternative (*e.g.*, install a minicomputer or purchase time external to the firm), the rational user will make these substitutions. If economies of scale exist, the central computer facility will be expanded.

Thus, a given user, permanently expanding his utilization of a shared resource, is likely to impose costs on all other users which probably will result in a future scale expansion of the resource. Overhead allocations can act as proxies for these future expansions, delay costs, *etc.* This problem is similar to the common resource or fishing example in economics—where the individual users have incentives to overconsume the common resource.[18] Perhaps additional insights to cost allocations can be gleaned by applying these economic analyses

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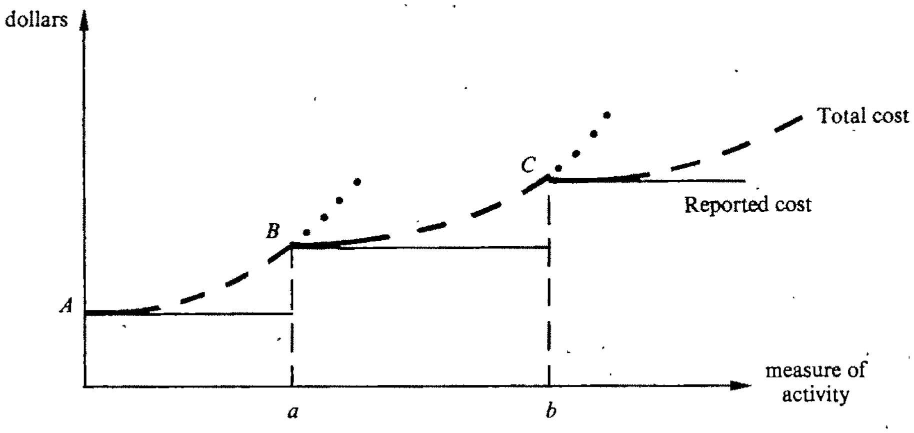
[18] See Gordon [1954] for the classic analysis of the common resource problem and Cheung [1970] for a more recent discussion of these externalities.

FIGURE 2

ANALYSIS OF STEP-COSTS



within the firm. We now turn to the manufacturing overhead example.

B. A Product Costing Situation

The typical textbook portrayal[19] presents a multi-department manufacturing concern with several service departments and production departments. Within each production department a job order (or process) costing system accumulates the prime costs—labor and materials—used in manufacturing the job (or product).[20] Each department's overhead costs as well as the department's share of the service departments' costs are allocated to each job by using direct labor hours as the allocation base. The department managers are evaluated as cost centers. This section explores how such an allocation scheme can increase the value of the firm.

Overhead application problems usually assume that the ith decentralized production manager chooses factor inputs, x^i_1 (labor) and x^i_2 (materials), to produce a single output $\bar{q}^i$ at minimum cost. If the two inputs cost P_1 and P_2 respectively, then the standard microeconomics solution is to equate the ratio of the factor prices to the rate of technical substitution (*i.e.*, the ratio of the marginal productivities of the inputs). In Figure 3, S is the point of tangency between the isocost line (having a slope $-P_1/P_2$) and the isoquant; denote the corresponding mix of inputs, $(\hat{x}^i_1, \hat{x}^i_2)$. If overhead is allocated based on x^i_1 (*e.g.*, direct labor hours) and since, by assumption, the manager minimizes total reported cost,[21] then the isocost curve facing the manager has slope $-P_1-R/P_2$ where R is the overhead rate per unit of x^i_1. The new point of tangency occurs at T, $(\hat{\hat{x}}^i_1, \hat{\hat{x}}^i_2)$, with the manager substituting materials for labor. By allocating overhead to the manager, the cost of x^i_1 is raised, thus causing a different mix of inputs to be selected. The question becomes one of determining whether the correct marginal cost of x^i_1 to manager i is P_1 or P_1+R; *i.e.*, under what conditions does R serve as a useful

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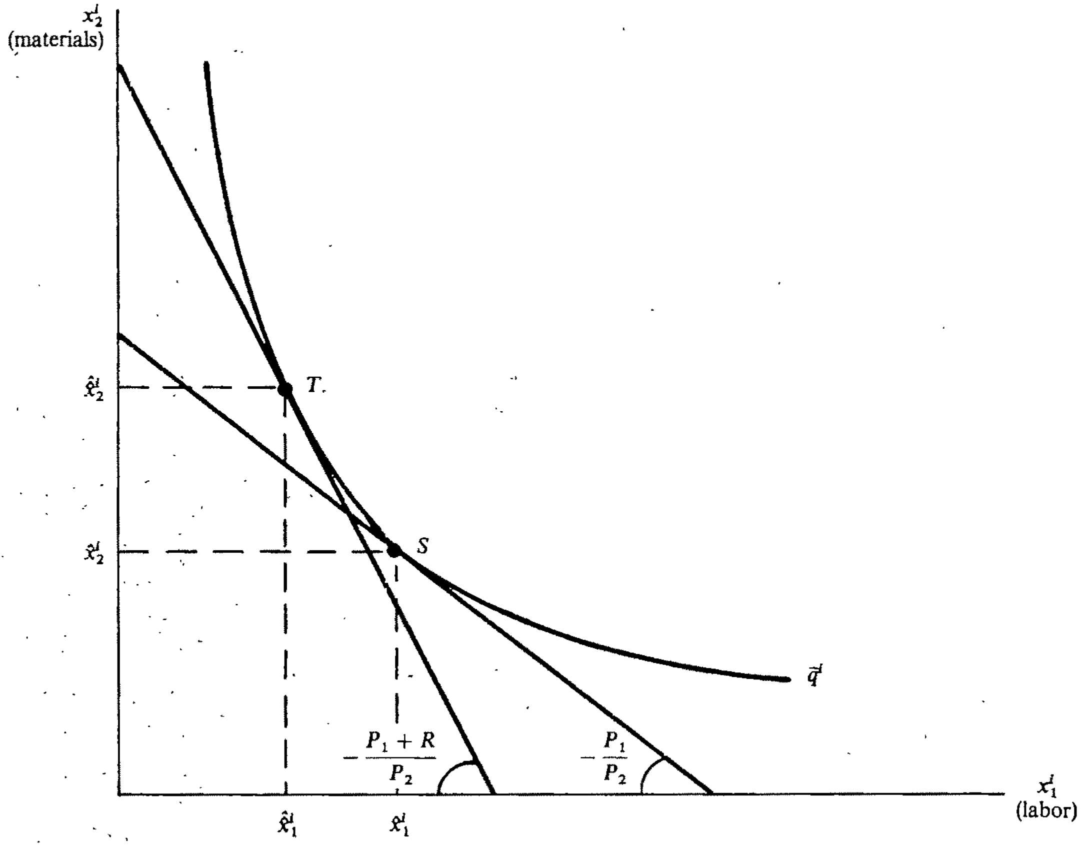
[19] For examples, see Chapters 4, 15 and 16 in Horngren [1977] or Chapter 13 in Dopuch, Birnberg, and Demski [1974].

[20] For purposes of this analysis, we will assume that standard costs are not used. The introduction of standard costs does not basically alter the results, but does substantially add to the complexity.

[21] A fundamental assumption in this section, which appears consistent with casual observation, is that managers attempt to minimize *reported costs*.

FIGURE 3

THE *i*th PRODUCTION MANAGER'S FACTOR MIX DECISION



proxy for some of the previously discussed externalities?

To address this question, additional structure must be imposed on the problem in order to explore what conditions could lead to point T being preferred to point S (*i.e.*, which point produces larger firm-wide cashflows?).

C. Organizational Structure and Decentralization

The first question to be addressed is: Why does the *i*th production manager exist; that is, why is a decentralized organizational structure employed? The literature on decentralization[22] suggests that, in general, limited cognitive capacity of the principal and the existence of investment alternatives with positive net present values leads the principal to delegate (or assign) decision-making responsibility to an agent: hence, decentralization. As outlined above, overhead allocations can serve a useful role, even in the situation where the agent's preferences are congruent with the principal's (*i.e.*, the maximization of shareholder wealth). The role of overhead allocations in this situation is to increase the reported factor cost (*e.g.*, direct labor) by an amount which approximates certain difficult-to-observe costs that arise from decentralization.

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[22] Some representative papers include Alchian and Demsetz [1972], Benston [1963], and Hirshleifer [1964].

Assume a multi-product manufacturing firm, where each of the m products requires two inputs, say labor and materials, and a commonly shared input such as a personnel department, corporate treasurer, accounting department, maintenance department, purchasing, *etc.*[23] To simplify the analysis without loss of generality, assume the firm is a price taker in all markets.

The firm must select the input and output quantities. The decision regarding who actually makes the decisions (*i.e.*, the delegation of decision-making authority) is the organization design problem. Numerous alternatives exist, including: one individual makes all decisions; each of m individuals select the output quantity, q^i, and the mix of inputs to produce q^i; or one individual or department (*e.g.*, marketing) could select the output quantities while each of m manufacturing managers selects the mix of the two factor inputs to achieve the desired output for each of the m products. The choice of organization structure involves trading off the gains of specialization, communication costs, alternative uses of the peak coordinator's time, *etc.*, against the additional costs of having m agents (*e.g.*, the additional coordination costs, salaries, agency costs, *etc.*).

This is obviously a complicated decision problem, one that has not been solved analytically. But firms have developed organization structures: decisions do get made. For purposes of this paper, assume that the "optimum" organization structure (*i.e.*, that structure which maximizes firm value) has evolved over time and involves a vice president of manufacturing who oversees m production managers, each of whom is responsible for meeting the production quota for one of the m products set by marketing. Furthermore, the manufacturing vice president selects the scale of the common factor of production.[24]

Notice that the production quotas selected by marketing may not and probably do not maximize firm profits at each point in time since in the decentralized organization being assumed, marketing does not have complete (or up-to-date) information on all factor costs and production technologies. The foregone profits from marketing not setting quantities which maximize profits is just one component of the costs of decentralization. In this example, it is assumed that alternative organizational structures result in even larger costs.

The decision to organize the firm with a centralized service department which provides S units of service per unit of time, controlled by the manufacturing vice president, is also an organizational design problem. Each manufacturing manager could conceivably perform all service-related functions (*e.g.*, payroll, purchasing, hiring, security) at some cost. However, the existence of significant economies of scale can justify the centralization of certain service activities.[25] It is assumed that providing the service from a centralized pool is the least-cost alternative.

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[23] Mathematically, the quantities of the m products are denoted by the vector $Q=(q^1, q^2, \cdots, q^m)$. The vector function, $Q=F(x_1^1, x_2^1, x_1^2, x_2^2, \cdots, x_1^m, x_2^m, S)$ describes the production function. Each output, q^i, requires two inputs, x_1^i and x_2^i as well as a commonly shared input S. x_1^i and x_2^i are purchased at constant prices, P_1 and P_2.

[24] The ith production manager specializes in selecting the optimum mix of factors for the ith product. That is, each production manager faces his own production function, $q^i=f^i(x_1^i, x_2^i, S)$, where S is determined by the vice president. Notice that such a decentralization of the manufacturing decision assumes that the firm's m-vector production function, $F(\cdot)$, is mathematically separable into m-scalar functions. It is unlikely that $F(\cdot)$ is mathematically separable in this fashion. Positive and negative externalities in $F(\cdot)$ are not captured by the m-scalar functions. For example, idle laborers on the ith product line who can be shifted to the jth line or crowding effects are formally captured in $F(\cdot)$ but are excluded in $f^i(\cdot)$, $i=1, \cdots, m$. These externalities impose costs on the manufacturing vice president which presumably were considered in his decision to decentralize.

The size of the service department is determined in this example by the vice president of manufacturing. In the "short-run," the scale of the service department is fixed. But in the "long-run" the vice president can vary the scale to minimize total manufacturing costs (which is assumed equivalent to maximizing his utility).[26] For any given "fixed" scale of the service department, a given production manager who expands his utilization of the service department imposes costs on his peers by reducing the amount of the "fixed" service available for the other departments, thereby generating delay costs and costs of degraded service. This crowding effect is an externality created by the manufacturing vice president when he delegated the factor mix decisions to the m agents. Assuming that the size of the labor force affects the utilization of the shared resource, if a production manager expands his labor force, and the scale of the common resource is not instantly adjusted, the other $m-1$ managers are affected. Over time the vice president will adjust the scale of the service department by equating at the margin the costs of changing the scale to the costs of delay and degraded performance of the service department. Each of the m managers does not directly consume the common resource but rather indirectly affects it by his utilization of the prime inputs, (x_1^i, x_2^i). For example, the ith production manager does not consume payroll services directly, but rather indirectly by expanding his labor force which then places more demands on the payroll department.

Given the organization structure as described, the value of the firm is larger (as is the manufacturing vice president's utility) if each production manager takes account of the costs which he imposes on the other managers by consuming more of the fixed resource when choosing his mix of inputs. That is, instead of just looking at the reported costs of the factors, each manager should also consider all the costs he generates via delays, degradation and eventual expansion costs in the service departments.

For each manager to choose the principal's (vice president's) cost minimizing mix of inputs requires either a centralized solution or an iterative solution to the problem unless the "total" marginal cost of the service department (*i.e.*, the marginal cost, including all externalities) is constant. That is, if the "total" marginal cost of the common resource varies as managers change the level of their production (thereby varying the utilization of the common resource), then each manager cannot select the "total" cost minimizing input mix until all the other managers have selected their input mixes, because the "total" marginal cost of the common resource is not known.

As in the WATS telephone example, several estimates of the "total" marginal cost of the shared resource exist. At one extreme, the marginal cost can be assumed to be zero. At the other extreme is a periodic and expensive cost analysis of all the externalities. Between these two extremes is an allocated cost. The problem which the vice president faces is to choose the optimum estimator of "total" marginal cost. As in selecting among statistical estimators, the cost of one estimator over another must be traded off against the cost of the difference in decisions that result from using one estimator or another. In particular, we are interested in determining a set of conditions under which point T (full-cost allocations) in Figure 3 strictly dominates point S (direct costing).

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[25] See Hirshleifer [1964].

[26] In this example, the overconsumption of perquisites problem discussed in the preceding section is ignored. Specifically, each individual's utility function is assumed to depend only on pecuniary income, which in turn is a function of reported costs.

D. Full Costing versus Direct Costing

Under an overhead recharge scheme, the manufacturing vice president structures an incentive system whereby the production manager is compensated for minimizing *reported* costs, including overhead. When the reported cost of the shared resource is allocated to the production managers on the basis of their utilization of one of their factors of production, each manager will reduce his use of that factor as depicted in Figure 3. This system estimates the "total" marginal cost of the shared resource, using the average cost of the shared resource and produces a minimum "total" cost (as opposed to minimum *reported* cost) only if the allocated cost happens to equal the "total" marginal cost of the shared resource.

The crucial question is: under what conditions does applying an overhead charge to the production manager maximize the value of the firm? If overhead is not allocated, then each manager presumably will consider only the factor prices (and the isoquant) in his production decisions. The vice president's decision to allocate overhead affects the reported costs facing the managers. Do conditions exist such that cost allocations strictly dominate no allocations? The graphical analysis in Figure 4 is used to examine these conditions.

The step function in Figure 4 represents the reported cost of the service department and in reality can take any shape—step-fixed (as drawn), step-variable (see Horngren [1977, p. 783]), *etc.* The curve, $K(X_1)$, denoted *dabc* represents the "total" cost of the service departments (*i.e.*, the sum of the reported costs and any incremental crowding externalities). The total cost of the service department, $K(X_1)$, is a function of all the managers' utilization of the shared resource, which in this example depends on their total direct labor,

$$X_1 = \sum_{i=1}^{m} x_1^i.$$

The step size (which is controlled by the vice president and need not be constant) is determined when the "total" costs just equal the reported costs. That is, if collectively all the managers are incurring opportunity costs slightly greater than the cost of expanding the service department, then it is in everyone's best interest to expand the service department. Hence, dabc is an upper bound to the reported costs.

As alternative way of viewing the relationship between the reported cost and "total" cost curves is as follows. The long-run reported cost of the service department is the step function. Over time, the scale of the service is adjusted whenver the cost of changing the scale is less than the cost of degraded service. If the scale can be varied instantly and in sufficiently small increments, then the reported costs and "total" cost curves in Figure 4 would be identical. But if these conditions do not hold, then the two curves are different.

At the beginning of each accounting period, the vice president estimates the overhead rate R by estimating the expected quantity of direct labor, X_1, and the expected reported cost of S.[27,28]

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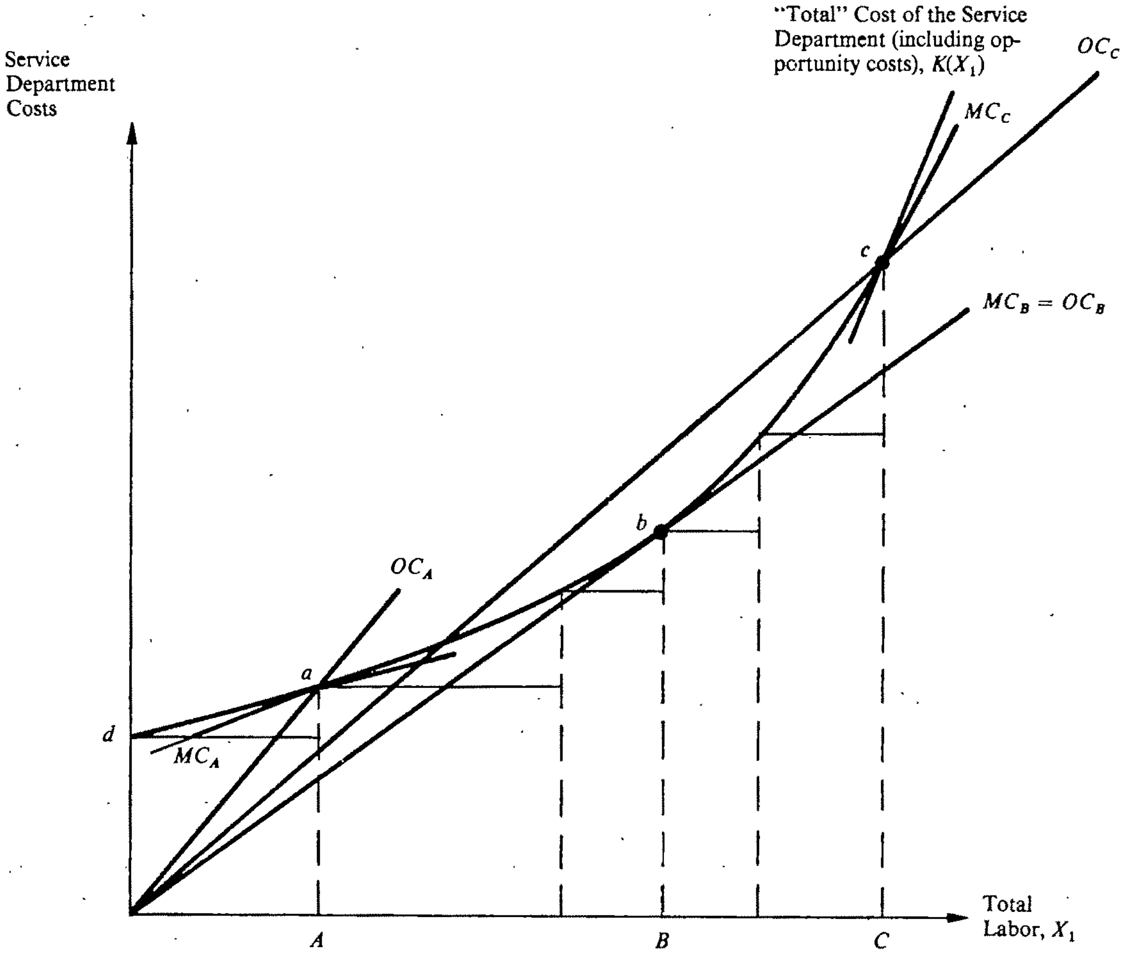
[27] Normal (expected) volume is the total expected demand for the first factor (*e.g.*, direct labor hours). In this example, the estimated quantity of X_1 and expected reported service costs are assumed to be unbiased forecasts of the actual usage of X_1 and actual reported costs. That is, all overhead variances are expected to be zero.

[28] At the preliminary stage of this analysis, the important question of the choice of allocation basis is

FIGURE 4

THE LONG-RUN RELATIONSHIP BETWEEN THE OVERHEAD ALLOCATION FUNCTION, OC, AND THE "TOTAL" COSTS OF A SERVICE DEPARTMENT, $K(X_1)$



Slope of MC_{X_1} = "Total marginal cost of the service department when total labor input is X_1
Slope of OC_{X_1} = Reported overhead cost per unit of labor when normal volume is X_1
= Reported cost at X_1 divided by X_1
= R

The ratio of these estimates yields the overhead rate, R. Graphically, if the expected quantity of X_1 (normal volume) by chance happens to be estimated at $X_1 = B$ and the estimated cost is $K(B)$ (reported and total costs coincide), then the overhead rate R is $K(B)/B$. Point B, given the shape of K as drawn, is the only point where marginal cost (the slope at

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ignored. To keep this analysis simple, degradation of service is asserted to depend only on the amount of direct labor, X_1. Whether to use direct labor or materials or some other basis to allocate the cost of the shared resource, depends on the sensitivity of the externality to the basis of allocation. We observe allocation bases being selected because of their causality with respect to the costs being allocated. [Solomons, 1968, p. 29]. The additional complexity that arises when a shared factor varies with two or more inputs must await future analysis.

B) and the average reported cost (the slope of the overhead cost function which equals R) coincide. If X_1 is expected to be at any other point, then the overhead allocation scheme does *not* coincide with "total" marginal costs and the agent's (reported) cost-minimizing mix of inputs does not minimize the principal's costs. If the expected quantity of X_1 does not equal B, then we are faced with a theory of second best: does an internal reporting system which employs an overhead recharge outperform one without recharges (*i.e.*, direct costing) in terms of maximizing the value of the firm?[29] There are two cases to consider:

Case 1. The expected quantity of direct labor, X_1, is greater than B (Figure 4) for example, point C. Since the "total" marginal cost, in this case MC_c, is greater than the average reported cost, OC_c, direct labor is over-utilized by each manager. The total price (P_1+R) being charged for labor by the accounting system is too low. But, since R is greater than zero, the over-utilization of x_1^i is still not as great as it would be if overhead is not allocated (*i.e.*, $R=0$). Under direct costing, the reported incremental cost of the service generated by an increment to x_1^i is zero ($R=0$), but the manager is aware of the benefits, and overconsumes direct labor. Under case 1, the overhead scheme unambiguously dominates the no-overhead (*e.g.*, direct costing) scheme. That is, point T in Figure 3 strictly dominates point S.[30]

Case 2. Expected volume is below point B, for example, $X_1=A$. Direct labor will be under-utilized by all departments if overhead is allocated. The price which each manager is being charged by the accounting system for the service per unit of x_1^i is greater than its "total" marginal cost. In this case the overhead recharge does not unambiguously dominate direct costing. In certain situations, it may be better not to charge the production manager for his incremental cost of the service, if by charging him, direct labor is reduced so drastically that the value of the firm falls from his slight over-utilization to a large under-utilization of x_1^i.

Even though an overhead allocation system does not strictly dominate no allocations, it can do so under certain situations (*e.g.*, $X_1 \geq B$ in Figure 4). Furthermore, firms can devise alternative allocation techniques to the average cost procedure implicit in full-absorption costing. For example, instead of basing the overhead rate on the total reported costs of the service department, if only some portion of the resource's cost (*e.g.*, variable costs) is used, then, under-utilization of direct labor is reduced. These alternative schemes result in lower overhead rates than the one computed by using full-absorption costing, thereby reducing the over-utilization of x_1^i (which occurs if overhead is not allocated). Yet, direct labor is not so under-utilized as to reduce the value of the firm below what it would have been if allocations were not performed. Besides devising hybrid overhead formulas, the vice president can place constraints on the minimum amount of direct labor which the manager must hire to prevent under-utilization or can place a limit on the amount of x_2^i (*e.g.*, materials or capital) which each manager can substitute for labor.

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[29] Since the firm is already calculating the cost allocations for external reporting and taxes, this analysis assumes that the incremental costs of reporting these allocations internally are minimal.

[30] Under direct costing, the variable overhead component of the service department is charged to the users. But in this example with step-fixed reported costs, variable overhead is zero. Furthermore, even if a step-variable reported cost curve was assumed, the variable overhead component, by definition, is always less than or equal to "total" marginal costs since, by assumption, the variable overhead component does not measure all the opportunity costs or crowding externalities.

This example demonstrates that manufacturing overhead allocations can increase the value of the decentralized firm. This situation arises when the firm has incomplete or imperfect information regarding the "true" shadow prices of all factors of production; in this case the true shadow price of direct labor includes the externality created by managers sharing a common resource. If top management has complete and perfect knowledge of all the cost functions, exact shadow prices could be calculated, overhead approximations become unnecessary, but then all decisions could be made centrally. Complete information is usually not the case and is an important reason for decentralization.[31]

In addition, this model suggests the following testable implications: we expect to find overhead allocations more prevalent in situations where average service costs (including all externalties) are increasing with increases in direct labor than in situations where average costs are decreasing. In these latter situations, we expect to find fewer full-cost systems, more hybrid overhead systems (*i.e.*, less than full cost overhead rates) and a greater frequency of centrally administered constraints imposed on the operating managers.

III. SUMMARY AND CONCLUSIONS

This paper examines the reasons why firms allocate costs. Much of the past literature dwells on the erroneous decisions resulting from managers basing their decisions on data containing cost allocations. Yet, few researchers have sought to explain why cost allocations are so prevalent in practice. Horngren [1977, p. 508] and Kaplan [1977, pp. 52–53] are two notable exceptions. They suggest that cost allocations are desirable mechanisms for motivating and controlling managers. Their suppositions are extended and amplified by this paper.

The important point emerging from this analysis is that cost allocations appear to proxy for certain hard-to-observe costs that arise when decision-making responsibilities are assigned to and vested in various individuals (*i.e.*, decentralized) within the firm. That is, when the rights to make certain decisions are assigned among the firm's managers, control and coordination problems arise. Cost allocations, when coupled with incentive schemes that induce the managers to pay attention to reported costs, help mitigate some of these control and coordination problems.

Two specific situations are discussed: (1) controlling the agent's overconsumption of perquisites and (2) proxying the costs of degraded service, delay, and future expansion that arise when a common resource is shared by several decision makers.

It is unlikely that cost allocations are "perfect" in the sense that they eliminate all the agent's overconsumption of perquisites or that allocated costs measure "exactly" all the costs arising from decentralization. However, as long as the benefits from cost allocations (*e.g.*, reduced perquisite consumption or less delay costs) exceed the costs of cost allocations (*e.g.*, the additional bookkeeping costs and the costs of erroneous decisions), then we expect rational individuals to employ allocation techniques. Likewise, if we observe voluntary, widespread, and persistent use of an accounting technique, it is likely that the technique is yielding benefits that exceed its costs.

Ultimately, this positive research will produce new normative allocation procedures—techniques that either increase the benefits or decrease the costs, or both. However, before new normative procedures can be devised, much more positive analysis, only begun in this paper, is required.

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[31] All cost functions could be known, but still a decentralized structure chosen if the costs of communication were sufficiently high.

The major obstacle to developing this positive analysis is in gaining access to data in order to test theories, which will generate new insights and produce richer theories, thereby better assessing the empirical magnitudes of the various costs and benefits. Even though the empirical tests will likely be based on a single firm or an industry, the results will still be generalizable. If the links between organizational structure, incentive schemes, agency costs, and cost allocations are correctly modeled, the empirical tests will control for these other variables and, the theory can be generalized to other organizational structures and incentive schemes.

Out of such a positive analysis, a better understanding of the role of cost allocations in solving various organizational problems, such as the agency and decentralization problems discussed in this paper, is likely to emerge. Then, more realistic normative procedures which descriptively better model the underlying phenomena can be constructed, thereby leading to improved allocation schemes.

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Attitude Research in Accounting: A Model for Reliability and Validity Considerations

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ABSTRACT: Attitude research in accounting has utilized numerous methodologies to study various topics of interest. However, the substantiation of the research techniques sometimes leaves a void which obscures the results. This paper presents a model which, if followed, allows for reliability and validity tests to be conducted which provide for acceptance of the attitude scales as viable measurement and theoretical research methods. When acceptable instruments are employed, the concepts tested can then enhance the goal of theoretical advancement. The instrument-issue controversy is dealt with through a review of attitude research in accounting. Positive comments and constructive criticisms are made. The "so-what" question of construct validity is analyzed: does it really matter if accounting attitude research is undertaken? The implication is that if the researcher does not consider the guidelines of the attitude model, the "so-what" issue may negate the potential contribution of such research.

ATTITUDES have been studied by behavioral scientists for many generations. Their research has measured attitudes toward many significant social issues. In an attempt to standardize the methodology and reporting techniques used by these researchers, Shaw and Wright [1967] collected a compendium of attitude scales. Their work included sections on definitions of attitudes, various scaling methodologies, and tests of reliability and validity, as well as a listing of research published. Their major criticism of attitude research was that little explanation was provided regarding reliability and validity measures performed by the researchers.

This criticism has also been leveled in economics for years. Morgenstern [1950, pp. 21–22] stated:

> whenever questionnaires are used . . . their precise text, with instructions for use, must be published together with the answers. . . . This circumstance [omission] deprives the results of virtually their entire value and statistics for which the user does not have the information available should be rejected, no matter how interesting and important the particular field may be.

Because of the date of Shaw and Wright's [1967] publication, no mention of attitude research in accounting was made. In fact, only within the past few years have accounting researchers had articles published regarding the use of attitude scaling techniques. Our literature search provided us with a minimal

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number of articles published prior to 1967. The advent and acceptance (tolerance?) of attitude research in accounting can be said to be relatively recent.

An adaptation of Gresham's law may be in existence in accounting attitude research. Bad studies (in terms of poor methodology and theoretical insignificance) may be driving out the good and giving an unfair reputation to all attitude studies. To improve attitude methodology and theoretical implications, some basic standards of reliability and validity should be adhered to by all researchers and readers of attitude scaling techniques. This paper develops such standards and presents considerations that should be made before undertaking further work in this area. The key standard is construct validity which focuses upon the interpretation of results and thus the relevance of attitude studies in accounting. This "so-what" issue is especially critical: Do attitude studies in accounting really matter? A major conclusion of this paper is that attitude differentiation is relevant only as an aid in the investigation of theoretical and empirical research issues in accounting; attitude differentiation is not an end in itself.

Another aspect of the "so-what" issue is also emphasized: can actions or behaviors be related to attitudes? The answer to this question has been considered countless times in the social science literature, but does not appear to be considered in accounting studies. Attitude research to date generally reflects an absence of a valid relationship between an attitude and an action or a behavior. Recognition of this limitation is essential to a complete understanding and interpretation of attitude research.

Without knowledge of the underlying concepts, assumptions, and statistical inferences inherent in attitude research, further studies will follow former errors. Thus, our three objectives will be to:

1. formulate a reliability-validity model from the social science literature which can be utilized to perform and evaluate attitude research concerning accounting issues,
2. review major accounting attitude studies to illustrate procedures for meeting the model's standards, and
3. conclude with suggestions and recommendations regarding future research in accounting attitude studies.

The implication is that if researchers do not perform the tasks suggested in this model, the "so-what" issue emphasized by the construct validity standard will soon give all attitude research in accounting a bad name.

The following sections of the paper take each of these three objectives in turn.

ATTITUDE RESEARCH MODEL

Formulation of an attitude research model involves investigation of previous attempts at model building. Psychologists and social scientists have, as previously stated, concerned themselves with methodological proprieties and improprieties for generations. Our model is extracted and synthesized from their deliberations.

In developing general research methodology, Campbell and Stanley [1963, p. 5] discussed factors which may jeopardize the objectives of experiments. Particularly relevant to attitude research are the following four factors:

- scale and questionnaire design
- sample selection
- analysis of results
- interpretation of results

The attitude scale and questionnaire design factor and the sample selection factor especially influence the analysis and interpretation of attitude research results, and thus, the application and interaction of these factors are of critical importance to the objectives of the attitude experiment.

In the following attitude research model, all four attitude research factors will be developed in terms of reliability and validity considerations. Osgood, Suci and Tannebaum's (OST) [1957] definitions will suffice as an introduction. "The reliability of an instrument is usually said to be the degree to which the same scores can be reproduced when the same objects are measured repeatedly" [p. 126]. "An instrument is said to be valid when it measures what it is supposed to measure" [p. 140].

Reliability

Concerning reliability, the accuracy or consistency of measurement is a general concern, *i.e.*, do the testing instrument and subjects produce consistent answers for similar questions? Does the subject have a bad attitude about the attitude survey as indicated by incomplete or inconsistent responses? Instrument reliability can be statistically tested by performing split-half or odd-even correlation upon two sets of independent, but similar, items within the instrument; *i.e.*, did the instrument generate consistent attitude results for groups of similar items? Subject reliability can be checked by test-retest correlations of responses; *i.e.*, did each subject have internally consistent answers for similar items? For example, a questionnaire elicits responses concerning a Financial Accounting Standards Board (FASB) exposure draft. Questions 1–5 are similar to questions 16–20. Did the instrument produce aggregate results that were consistent or similar for these two sets of questions, and did each subject produce results that were consistent or similar for these two sets of questions?

Another aspect of reliability is the discriminating ability of a testing instrument. An example concerns multiple-choice questions on an examination. Assume for the moment that the sole function of an exam is to discriminate among pass/fail students. If all students responded correctly to a particular question, the discriminating ability of that question would be nil. It did not adequately test the students' knowledge by segregating them into pass/fail categories. Each multiple-choice alternative is also an indication of such reliability. If no student selected a particular response, that choice's discriminating ability also is absent. Individual questions and individual responses should provide for categorization of students into various performance levels or the reliability of the instrument is very questionable. *This is the common item analysis test of discriminate reliability.* As one guideline, the Educational Testing Service uses a 90 percent cutoff for its item analysis of the Scholastic Aptitude Test. If more than 90 percent get a question right or wrong, it is discarded from the test [Zonana, 1978].

Evidence of reliability analysis is crucial, as it permits the reader to judge whether scores are sufficiently dependable to support the experimental results. However, if reliability tests are not performed, the interpretation of results is quite limited, since the reliability of the responses is a foundation necessary for analyzing validity. As an extreme example, a study may make conclusions which are supported only by incomplete and inconsistent responses, such as saccharin being a cause of cancer because a very few rats eating huge amounts of saccharin developed cancer.

Validity

The validity consideration should be

further expanded in terms of the critical attitude scale and questionnaire design factors described by the American Psychological Association (APA) in its definitions [1966, p. 12]:

1. Content Validity: the test user wishes to determine how an individual performs at present in a universe of situations that the test situation is claimed to represent.
2. Criterion-Related Validity: the test user wishes to forecast an individual's future standing or to estimate an individual's present standing on some variable of particular significance that is different from the test.
3. Construct Validity: the test user wishes to infer the degree to which the individual possesses some hypothetical trait or quality (construct) presumed to be reflected in the test performance.

Since these definitions were developed by psychologists, some examples of accounting-related issues might help. Content validity indicates that demographics or characteristics of samples selected must be investigated to ascertain the comparability between control and experimental groups or between experimental and omitted groups. Therefore, if an attitude study utilizes students as surrogates for business decision makers, the similarities and differences of these two groups should be considered before conclusions are made.

Criterion validity cautions against prediction of subsequent behavior from attitude studies. Just because a student has a positive attitude toward an introductory accounting class, this attitude does not directly indicate or predict that he/she will become an accounting major. Too many mitigating factors might intervene to determine the student's behavior.

Finally, construct validity deals with the extrapolation of results. Using a theory to develop a hypothesis, utilizing an instrument to test that theory and then extrapolating the results back to the theory are not simple tasks. For example, the turnover studies of Sorensen, Rhode and Lawler (SRL) [1973] indicate that a theory of the reasons for turnover in CPA firms may not be easily tested or investigated through an attitude study. Construct validity accordingly emphasizes the "so-what" issue. Are attitude studies theoretically or empirically important? Does it really matter what the attitudes of Fairfield, Iowa, CPAs are toward their college experiences five years after college graduation? Do attitudes have a major effect on turnover?

The four attitude research factors and the reliability-validity considerations are combined into an attitude research model as shown in Table 1.

The scale and questionnaire design factor is shown to be significantly influenced by reliability considerations, by the content validity consideration of definitions employed in the questionnaire, and by the criterion validity consideration of performance measured by the attitude scale. The major influence upon the sample selection factor is the content validity consideration of sampling procedures. The major influence upon the analysis-of-results factor is the criterion validity consideration of statistical analysis, and the major influence upon the interpretation of results factor is the construct validity consideration of results extrapolation.

This model has certain inherent qualifications which preclude numerous attitude studies from achieving total acceptance. Major influences could reject a particular study from an acceptable category, while a sufficient number of contributing factors could cause a study to be denied authenticity. Each of these factors, as used in accounting attitude research, is utilized as a standard toward acceptability in the next section.

TABLE 1
ATTITUDE RESEARCH MODEL

	Attitude Research Factors			
Reliability-Validity Considerations	*Scale and Questionnaire Design*	*Sample Selection*	*Analysis of Results*	*Interpretation of Results*
Reliability: Consistency and stability of measurement	major		contributing	contributing
Content Validity		major	contributing	contributing
a) sampling procedures				
b) definitions employed	major		contributing	contributing
Criterion Validity	major		contributing	contributing
a) performance measurement				
b) statistical analysis			major	contributing
Construct Validity: Extrapolation of results				major

Note: "Major" and "contributing" indicate degrees of influence of the reliability-validity considerations upon the attitude research factors.

APPLICATION OF THE MODEL: LITERATURE REVIEW

The objectives of our model are to facilitate the performance and evaluation of attitude research in accounting. The implementation of the model will be illustrated through the review of several accounting attitude studies in this section of the paper.

The focus of the model's application will be on the reliability and validity considerations and corresponding effects on the research factors in various attitude research studies. This section is divided accordingly into reliability, content validity, criterion validity, and construct validity topics.

The articles reviewed in this paper represent most of the major attitude research projects undertaken in current accounting literature, are strong in many of the reliability and validity considerations of the model, and offer the best basis for illustration of such considerations. The rigor of the model overwhelmed many other attitude research articles where deficiencies existed in most all reliability and validity categories of the model and bases for constructive illustrations were sparse. Some deficient articles are noted, however, for purposes of indicating improvements which could be made. The strong articles will be used to illustrate the model, while the others will be used to provide direction toward potential acceptance of attitude research in accounting.

Reliability

An example of intensive reliability analysis in the accounting attitude literature is Sorensen and Sorensen's [1972] study. Their study examined the organizational and professional profiles and migration plans of 129 randomly selected CPAs in large firms and compared their results obtained in 1965 and 1970. To check instrument reliability, total responses or weightings of questions were statistically verified for consistency by using coefficients of determination from the Kuder-Richardson item analysis. Also, linear correlations between scale totals were used to verify that the several scales used in the research instrument were independent. To check subject reliability or internal consistency in responses, test-retest correlations of subject scores were performed. Many of the other studies reviewed failed to disclose any reliability tests which might have been conducted. Thus, one recommendation is to ask for inclusion of such data, because reliability is a necessary condition for subsequent validity measures [APA, 1966, p. 29]. Other studies using comprehensive reliability tests are noted in the summary Table 2 at the end of this paper.

Validity

Once reliability considerations for scale and questionnaire design are satisfied, the focus can switch to the validity considerations for the attitude research factors shown in Table 1. The two major aspects of content validity are adequacy of sampling approach and adequacy of definitions used in the testing instrument.

Content Validity: Sampling Procedures

Sampling adequacy, as in any research, is needed to prevent selection bias and to prevent interaction effects among selection and experimental variables. The research should always indicate what universe is represented and the methods and limitations of the sampling.

Examples of adequate sampling disclosure include the Strawser, Ivancevich and Lyon (SIL) [1969] study where testing for potential selection bias was conducted by determining demographics of non-respondents as well as respondents. Their study investigated job satisfaction among accountants in both large and small CPA firms. Also Copeland, Francia and Strawser (CFS) [1973] corroborated their study with observations from different universities to address selection bias. This study examined the use of students as surrogates in business research and compared them to practicing analysts, CPAs, and professors.

The categorization and non-response issues may prove critical to eventual interpretation of results. For example, Braunstein and Fortner [1968], in a discussion of an attitude study by Patten and Steinmetz [1966], discovered an omission of reasoning for dividing 120 students from five business classes into two groups for subsequent statistical analysis. If such categorization is not justified, the demographics of such groups, even though randomly assigned, could bias and undermine the conclusions of the study.

A dramatic example of ignoring the demographics of the non-response group occurred in previous heart attack research. To determine the cause of heart attacks, researchers interviewed recent heart attack patients and found that they were coffee drinkers. Thus, the conclusion was that coffee drinking caused heart attacks. The non-response issue was ignored because the other heart attack victims were not alive to be interviewed. When their case histories were reviewed, those heart attack victims were found to be non-drinkers of coffee. Therefore, coffee drinkers actually had a better chance of heart attack survival than non-drinkers.

The content validity of attitude research is seriously challenged in studies where large mailings are undertaken and only the returned questionnaires are analyzed without attention being directed to non-returns. Responses can be divided into various groups: those received after the first mailing, those received after a reminder has been mailed, those received after statistical analysis has been undertaken, and those never received. Content validity tests, such as those performed in the SIL [1969] and CFS [1973] studies, should be done to ascertain if the various groups of respondents and non-respondents can be considered equivalent. If they are not, a sampling bias will exist to negate the sample selection factor of the attitude research model. This problem will challenge the validity of subsequent data analysis and interpretation of results. Thus, an *ex ante* plan for dealing with non-respondents should be considered.

Content Validity: Definitions Employed

Evaluating the adequacy of definitions employed in the instrument, the second aspect of content validation, is similar to "subjectively recognizing the adequacy of a definition" [APA, 1966, p. 13]. Each statement in the attitude questionnaire is designed to elicit attitude responses, and should involve only a single attitude variable to avoid confusion for respondents and in data interpretation. For example, an improperly combined attitude statement would be: the FASB should follow a theoretically proper financial accounting framework and also should follow a policy of full and adequate disclosure. Proper attitude statements would divide the theory and disclosure issues into two separate items.

Evaluating the adequacy of definitions used is critical in interdisciplinary research. Re-using or slightly modifying an instrument that is valid in one discipline but possibly not in accounting could produce results which are not comparable between functional areas and may not even be capable of being extrapolated to accounting theory. Haried's [1972; 1973] works with the semantic differential using accounting terminology are examples of adequate planning where he rigorously pre-tested his instrument for reasonable accounting terms and bi-polar adjectives before administration to his subjects.

A further problem with the straightforward application of another discipline's theory to accounting is the possible failure to consider deficiencies of that theory. These deficiencies can affect the scale and questionnaire design (content validity) and the corresponding analysis and interpretation of results (criterion and construct validity).

For example, several attitude studies in accounting [SIL, 1969; Strawser, Ivancevich and Herbert, 1971; Ivancevich and Strawser, 1969] have elicited job satisfaction responses and then implied that these responses are related to motivation and productivity. Specifically, in commenting upon the SIL [1969] study, Ross and Bomeli [1971, p. 384] pointed out three problems with Maslow's theory which affect the job satisfaction measurement of CPAs:

> 1. Job satisfaction is essentially complex, personal, and subjective, and individual responses about job satisfaction necessarily reflect a group of attitudes not precisely defined by proponents of Maslow's theory.
> 2. The theory also fails to differentiate between cause and effect. Thus, it is not clear whether high satisfaction with autonomy needs results in high performance and quality or whether high performance and quality result in high satisfaction.
> 3. Finally, Maslow's theory in itself generally lacks predictive ability. That is, research has not substantiated that needs are always arrayed in a hierarchy or that a satisfied need is no longer a motivator.

Ross and Bomeli [1971, p. 388] also stressed that their criticism was to emphasize the complexities and ambiguities of job satisfaction and motivation not covered in the SIL [1969] article. This transferability problem was summarized as follows:

> One purpose of this comment is to impress upon the reader the complexity of these variables which are often oversimplified in the accounting and psychology literature. In all probability job satisfaction and motivation are individualistic variables (i.e., not a simple bivariate function).

If theoretically sound definitions are not employed, related problems arise in the interpretation of results. Consequently, the theoretical problems involved in the satisfaction-motivation relationship will be further developed in the construct validity section of this paper where results of attitude studies are analyzed.

A final consideration in recognizing the adequacy of definitions is that the attitude statements should be expressions of desired behavior and not statements of fact. People with differing attitudes will still agree on statements of fact. For example, Nixon resigned (fact). Nixon should have been impeached (what is your attitude?). A convenient guide-line for constructing statements of desired behavior is the use of the normative term "should."

Criterion Validity: Performance Measurement

Two major aspects of criterion validity are performance measurement and statistical analysis of results. All measures of the attitude criterion should be described. In fact, "whenever feasible, [the research] should draw attention to significant aspects of performance that the criterion measure does not reflect" [APA, 1966, p. 16]. A critical point in current attitude research is that the results measure only attitudes, not behavior patterns [Fishbein, 1967, p. 477], and thus behavior predictions or conclusions should not be made. Also, a single score measured in attitude research does not reflect the three different components of the traditional attitude definition: affective (evaluations and emotions), cognitive (beliefs or opinions), and conative (action tendencies). Accordingly, the interpretation of attitude results should not make specific conclusions about evaluations, beliefs, or action tendencies without breaking down the single attitude score into its component parts. For examples of operational procedures to measure these attitude components, see the Sorensen *et al.* study [1975].

The type of response scale is an important attitude research factor in measuring performance. The Likert scale has five or seven response alternatives, while the semantic differential and Porter scales both use seven response choices. In explaining the use of the seven-point scale, OST [1957] cited research among students where all seven alternatives tended to be used with roughly equal frequencies. When nine steps were used, several positions had quite lower frequencies, and when five steps were used, students expressed frustration at not being able to discriminate finely enough. Further research was stressed:

> In the study with Stagner, for example, samples of American Legion members were obtained, and it was noted that they had a definite tendency to use only three positions—all, or nothing, or neither (1, 4, 7, on the seven-step scales). Grade-school children seem to work better with a five-step scale, and there is probably some relation here to intelligence differences. Bopp's study with schizophrenics showed that these patients used the finely discriminative positions of seven-step scales (2, 3, 5, and 6) significantly less frequently than their controls [OST, 1957, p. 85].[1]

Also, instead of using a 1 to 7 rating for the scale points, the 0±3 format should be used to establish an anchor point for the respondent and to emphasize the bipolar nature of the scale.

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[1] See also Miller [1956].

The Likert, semantic differential, and Porter types of attitude scales are the ones predominantly used in current accounting attitude research. While some use is made of the Guttman scaling technique, we will concentrate primarily on the above three for subsequent discussion. Thurstone scaling techniques, while utilized in other social science literature, were not evident in accounting-related research.

The Likert, semantic differential, and Porter scaling techniques are defined as summated rating scales which are "a set of attitude items, all of which are considered of approximately equal 'attitude value,' and to each of which subjects respond with degrees of agreement or disagreement (intensity)" [Kerlinger, 1973, p. 496]. Two major characteristics of summated rating scales are important for performance measurement and corresponding analysis and interpretation of results. First, since the universe of items is considered to be of equal attitude value, there can be no scale across items, only scaling of individuals through summation or averages of individuals' responses. Thus, results should be compiled for individuals, not items. Second, since these five- or seven-point scales allow for greater diversity of attitude expression, greater response variance occurs and more potential for data analyses exists.

Another aspect of performance measurement in the testing instrument is the reversal of approximately half of the rating scales. For example, in Likert scales, the extremes of the "strongly approve" and "strongly disapprove" should appear equally on one end of the attitude continuum for the various statements to be rated. This format reduces the tendency toward stereotyped or set responses which is a threat to valid measurement, as it confounds attitude and personality trait response variance [Likert, 1967]. This format will also identify the unreliable subject who automatically checks one end of the attitude continuum for all questions. This reversal process can easily be incorporated into attitude questionnaires and is another aspect of the scale-questionnaire design factor.

Haried's [1972; 1973] works on terminology in financial statements utilizing the semantic differential are comprehensive references for these criterion validity procedures. For example, to avoid set response approximately one-fourth of the bipolars were switched so that a favorable response would appear on the right end of the seven-point response continuum in one-fourth of the answers.

Criterion Validity: Statistical Analysis

The other major aspect of criterion validity is statistical analysis of results. Statistical analysis should be reported so that the reader can ascertain what confidence is to be placed in judgments or predictions regarding the individual [APA, 1966, p. 20]. The typical attitude research computes average responses of various groups and performs significance tests on means to determine group differences. Just reporting differences between group means does not provide adequate information to determine confidence in results. Once again, many of the studies reviewed failed to disclose any statistical tests undertaken. If the intragroup variance is large, classifications may be misleading even if significant differences in means do exist:

> A description indicating amount of misclassification or overlapping should be included. The emphasis should be on descriptive statistics for individuals; a significance test alone is insufficient [APA, 1966, p. 21].

Descriptive statistics such as central tendency (mean, median) and variability (standard deviation) provide data for the user or reader to examine the amount of overlap or misclassification in various groups and to examine the validity of the sample in the interpretation of results [Watson, 1974].

A major statistical issue, which has direct implications for accounting attitude research, is the choice of statistical methods for analyzing various data. This is the familiar parametric/non-parametric statistics debate.[2] The crux of the issue is the relevance of the database characteristics. The major dichotomy is between ordinal (non-additive) data and interval (additive) data. If only ordinal data is obtained from the summated rating scales used in accounting attitude research, then the results cannot be added together. The only measures of central tendency available for ordinal data are the mode and the median. The only significance tests available are *chi*-square tests and order statistics, such as the sign test and the Friedman test for matched groups [Hays, 1973]. Thus, a *t* test for significant differences in means of ordinal data is meaningless because ordinal data are non-additive.

The lack of equal intervals which reflect additive data characteristics was the key difference between Kerlinger's [1973] classification of summated rating scales, such as the Likert scale, and the equal-appearing interval scale, such as the Thurstone scale. Thurstone [1967, p. 89] was also careful to make this distinction in discussing the interval characteristics of his scaling procedure:

> The differences between the means of several such distributions may be directly compared because of the fact that a rational base line has been established. Such comparisons are not possible when attitudes are ascertained merely by counting the number of endorsements to separate statements whose scale differences have not been measured.

This statistics-data characteristics argument is far from being resolved. An expedient procedure in attitude research for this issue might be to compute means and medians for the various responses and examine results under both procedures. Also, correlation and significance tests could be computed with both parametric and non-parametric statistics and examined for consistency. Conflicting results would then preclude the use of parametric statistics in analyzing experimental data. If parametric and non-parametric results were consistent, the parametric statistics employing additive assumptions would continue to be used. The CFS [1973] study employed one of the few research procedures which acknowledged the ordinality problem for the scale data characteristics. In determining levels of significance, the Mann-Whitney *U* test was used because of the ordinal scale.

While most accounting studies surveyed did not argue for the use of parametric statistics, these tests are advocated by various statisticians (see Anderson [1961] and Kerlinger [1973]) to provide substantially more weight to the eventual interpretation of results. Inclusion of these tests when consistent with non-parametric results would not negate any study conclusions but should be considered as additional evidence of rigor. As mentioned previously, this debate continues and, until resolved by statisticians, remains controversial. At this point accounting researchers should at least realize and recognize that this dilemma exists when designing, analyzing, and interpreting attitude studies.

Statistical procedures for validating

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[2] See Anderson [1961] and Kerlinger [1973] for a detailed examination of this debate.

the semantic differential scale include the use of factor analysis to determine if the bipolar adjectives are defining semantic space in accordance with the established potency, evaluative, and activity factors [OST, 1957, p. 143]. The advantage of using this attitude scale is that well-known reference points are available for validity evaluation. Such a test should indicate the proportion of the variance attributed to widely known reference factors [APA, 1966, p. 24].

Statistical analysis approaches in accounting literature show much imagination. The following tests are examples of adequate statistical analysis because both significance and central tendency statistics were used:

- tests for differences in attitudes of groups:
    - Cook [1967] who investigated the effect of frequency of feedback on attitudes and performance of 120 accounting students in 4 different classes,
    - Savich [1973] who compared CPA partners' and top management representatives' attitudes toward significant accounting issues to determine if clients agree with their own auditors or other audit firms' position statements, and
    - Chandra [1974] who studied security analysts' and accountants' attitudes toward financial statement disclosure.
- correlation between beliefs and actions:
    - Loeb [1971] who randomly sampled 122 CPAs regarding their attitudes toward ethics.
- disclosures of data variability between groups:
    - Sorensen and Sorensen [1972] who studied professional profiles in CPA firms, and
    - DeCoster and Prater [1973] who studied the use of experimental games in six introductory accounting classes of 138 students.

At the same time, the reporting of only mean values is an example of incomplete statistical analysis for criterion validity since significance tests were not performed nor data variability disclosed:

- Patten and Steinmetz [1966] who asked 120 students in five elementary accounting classes what they thought of the course,
- Brenner [1970] who asked 1241 stockbrokers, analysts and bankers about the desirability of reporting current cost information, and
- Chandra [1975] which was an extension of the 1974 article on financial statement disclosure.

Construct Validity

The major aspect of construct validity is the interpretation of results, the "so-what" issue. The proposed interpretation should be cognizant of alternative theoretical interpretations in the subject area where the research is attempting to make a contribution.

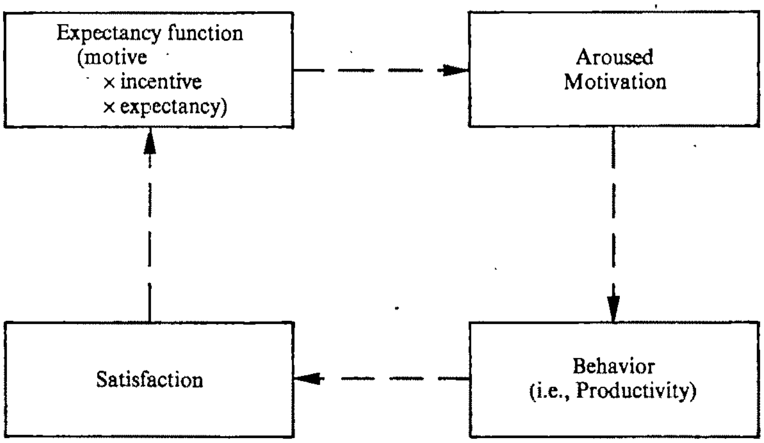
> If the author proposes to interpret the test as a measure of a theoretical variable (ability, trait, or attitude), the proposed interpretation should be fully stated. The interpretation of the theoretical construct should be distinguished from interpretations arising under other theories [APA, 1966, p. 23].

Ideally, major studies investigating different theoretical inferences in the attitude area should be considered in each attitude research project to facilitate interpretation of results.

As an example, the satisfaction-motivation controversy previously discussed under the content validity aspect of definitions employed is reintroduced. Expectancy theory deals with the complexity of these satisfaction-motivation relation-

FIGURE 1

EXPECTANCY THEORY AND EXTENSIONS



Note: The behavior and satisfaction terms were added to the original expectancy theory function, based upon relationships suggested by expectancy theory.

ships. Vroom's [1964] model of expectancy or goal path motivation theory incorporates various complexities of human motivation and attitudes and an adaptation of this model is shown in Figure 1.

In explaining the diagram, aroused motivation is no longer a simple bivariate function of satisfaction, but is:

> . . . a joint multiplicative function of the strength of the motive (or need), the value of the incentive offered for certain acts (or behavior), and the expectancy that the acts will lead to the attainment of the incentive [Ross and Bomeli, 1971, p. 385].

The previously accepted positive relationship between satisfaction, motivation, and productivity has accordingly been empirically challenged in recent studies. Expectancy theory may explain the low correlations between these variables:

> A high performer will be highly satisfied only when the perceived reward, whether extrinsic or intrinsic is valued as an incentive, the individual expected it, and finally receives it. On the other hand, a low performer may be quite satisfied with a small reward because he expected little [Ross and Bomeli, 1971, p. 386].

As emphasized in Figure 1, job satisfaction may be related to motivation only through its influence upon the various elements of the expectancy function. Satisfaction accordingly may be related only to productivity through its indirect influence upon motivation.

Consequently, to enhance the relevancy of attitude research, attitude researchers should use these types of expectancy theory relationships in attempting to investigate the influence of satisfaction attitudes upon motivation and behavior. Then, attitude research, rather than merely identifying the existence of attitude differences, could elaborate upon the implications of these differences and be considered a viable research method for the investigation and advancement of theory.

By investigating the construct validity problem in more depth, attitude research could become more relevant to managerial problems. For example, attitude research may help explain the variables involved in the generation gap between partners and staff which is a primary factor in the turnover problems for CPA firms [SRL, 1973]. In fact, the SIL [1969] data, subject to the previous validity constraints, support the existence of an additional generation gap concerning top-level versus middle-level management in CPA firms. If the satisfaction, motivation, and performance linkages of Figure 1 can be identified, they could be incorporated into a personnel monitoring system to help reduce the management problem of turnover:

> A system which endeavors to develop a strong relationship between satisfaction and productivity may be better still. Hopefully, turnover would then be restricted to poorly motivated personnel with low need satisfaction [Ross and Bomeli, 1971, p. 388].

FUTURE RESEARCH CONSIDERATIONS

The reader should now be aware of both acceptable and unacceptable examples of attitude research in accounting. The question now becomes: what should a researcher or reader do to insure adequate compliance with the model factors so as to achieve acceptance of attitude methodology and results? This section summarizes our suggestions to facilitate achievement of these criteria in the model.

To gain closure on the subject, our recommendation is to use Table 1 as a general overview for the performance and evaluation of attitude research. For specific reliability and validity procedures in attitude research, use Table 2 as a checklist. These operational procedures, most of which were cited in the text of this paper, are grouped by type of attitude scale.

The following suggestions for methodology improvement are derived from examples of properly applied reliability and validity procedures in Table 2. Reliability should be examined in terms of both subject and instrument item scores. Inconsistent or incomplete subject scores and inconsistent or non-differentiating attitude statements should be eliminated to establish reliability which is a necessary condition for validity to exist.

For content validity, random sampling should be used and demographics should be studied to determine any possible selection or non-response bias in the sampling procedures. Single attribute statements which express desired, not factual, observations should be used. To minimize researchers' subjectivity in instrument construction, an expert panel could be used to test and validate attitude statements. The adequacy of definitions can also be supported by established literature, such as OST's [1957] list of differentiating bipolar adjectives for the semantic differential. In using interdisciplinary research, careful review of the controversies and conflicting theories is needed in constructing adequate definitions and in using terms for the questionnaire design. Oversimplification, such as direct correlation of belief and behavior, should be avoided.

In the performance measurement factor of criterion validity, five- or seven-point scales should be used, and only subject responses should be normally scaled, not items, because the attitude statements are of equal value. To reduce mechanical and unreliable responses, the scales should occasionally be reversed. For the criterion validity aspect of statistical analysis, there should be disclosure and significance testing of variability as well as mean or median statistics to analyze the degree of consensus in the responses. The data characteristics prob-

TABLE 2

RELIABILITY AND VALIDITY PROCEDURE CHECKLIST.

		Content Validity		*Criterion Validity*		
	Reliability	*Sampling Procedures*	*Definitions Used*	*Performance Measurement*	*Statistical Analysis*	*Construct Validity*
Likert Scale	Both subject and instrument reliability checked [Savich, 1973] consistency problem for instrument reliability checked [Brenner, 1968]	Random sample; examination of demographics [Sorensen and Sorensen, 1972]	Uni-dimensional attributes; desired, not factual, statements; expert panel review [DeCoster and Fertakis, 1968]	Normal five- or seven-point response scale; frequency counts for relative usage of scale points [Savich, 1973] people, not items, scaled; creation of segmented attitude attribute scales [Sorensen and Sorensen, 1972] and [Sorensen *et al.*, 1975]	Significance testing of means, disclosure of descriptive statistics, and factor analysis for subscale identification [Sorensen and Sorensen, 1972] acknowledgment of data characteristics problem: both parametric and non-parametric correlations [Cook, 1967] factor analysis for theory integration [Savich, 1973]	Investigation of attitude-behavior linkages [Loeb, 1971] attitude-turn-over relationships investigated [SRL, 1973]
Semantic Differential	Both subject and instrument reliability checked	Random sample; *chi*-square on demographics to show similarity of groups [DeCoster and Prater, 1973]	Selection of bipolars: 1. triad procedure [Haried 1972; 1973] 2. established factors used [DeCoster and Prater, 1973]	Seven-point response scale; random reversal of scale continuum [DeCoster and Prater, 1973] randomized distribution of bipolar adjectives [DeCoster and Prater, 1973]	Factor analysis to verify established factors of semantic space [Haried 1972; 1973] acknowledgment of data characteristics problem; 1. *Chi*-square on response frequency [Braunstein and Fortner, 1968] 2. non-parametric ANOVA by rank [DeCoster and Prater, 1973]	Attitudes related to learning theory [DeCoster and Prater, 1973] establishment of linkages between semantic meaning and investor's use of financial information
Porter Scale	Both subject and instrument reliability checked	Random sample; demographics of non-respondents analyzed for selection bias possibilities [SIL, 1969].	Complexity of attitudes linkages considered, such as expectancy theory [Ross and Bomeli, 1971]	Unobtrusive scaling of perceived deficiencies; possible scaling of items [SIL, 1969; CFS, 1973]	Acknowledgment of ordinal data characteristics in using non-parametric significance tests [CFS, 1973]	Further examination of attitude-behavior linkages advocated [CFS, 1973]

Note: Non-cited procedures are our recommendations.

lem concerning additivity must also be recognized. If data characteristics are uncertain (ordinal or interval), suggested recommendations are the application of central tendency and significance statistics of both non-parametrics and parametrics. If the results are similar, the parametrics' advantages, such as power and versatility, should be used in summarizing results.

The potential advantages of using factor analysis in analyzing attitude responses would seem to facilitate additional use of the technique, subject to the inherent subjectivity in identifying or naming the significant factors. Some of these advantages (and corresponding research studies) are summarized below:

- Identification of subscales [Sorensen and Sorensen, 1972],
- Linkage to factors derived from theory [Savich, 1973],
- Investigation of subject consensus (*Q* type factor analysis) [Savich, 1973],
- Verification of established semantic factors [Haried, 1972; 1973], and
- Investigation of difference in semantic space [Haried, 1972; 1973].

The construct validity considerations of the attitude model address the issue of attitude research utility in accounting. The model emphasizes the theoretical interpretation of attitude research results. The thrust of much attitude research appears to be, "All that matters is your attitude" [Simon, 1975]. This emphasis is misdirected, as it begs the "so-what" issue concerning theoretical and empirical relevance of attitude studies. Mere summaries of various groups' attitudes contribute little to theory or empirical applications.

Attitude differentiation is usually significant only in connection with other research findings, such as the turnover study and the expectancy theory examples. A renewed investigation of belief-behavior linkages, such as the satisfaction-performance relationships indicated by expectancy theory, appears to be crucial to improving the utility of attitude research concerning accounting problems. This recommendation stresses an integrative research approach where attitude measurement is only one aspect of the research task. For example, potential utility would result from investigating semantic meanings and the corresponding use of financial information (the individual investor behavior issue) and from investigating relationships concerning satisfaction, motivation, productivity, and turnover (the human resource management issue). Substantive research projects along these lines would improve the utility of attitude measurement as one research tool for investigating accounting problems. One should consider that properly applied attitude research has the potential to be as rigorous a technique as regression analysis, for example, and should not be relegated to casual investigations of trivial topics.

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An Empirical Analysis of Tax Court Decisions in Accumulated Earnings Cases

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ABSTRACT: The results of this study are based on a statistical analysis of post-1954 accumulated earnings cases litigated in the Tax Court. The primary purpose was to identify the variables drawn from the regulations and IRS Audit Guidelines that have discriminated cases won by taxpayers from cases lost by taxpayers. A secondary purpose was to compare the relative discriminatory power of the regulations with that of the unpublished Guidelines. Discriminant analysis, using a stepwise procedure, was performed on the 59 cases included in the study. While the variables were capable of discriminating between winning and losing cases, the IRS Guidelines proved to be the more powerful discriminators. These results have important implications for taxpayers, for the Internal Revenue Service, and for policymakers and those who wish to influence them.

In the United States the corporation has always been treated as a separate taxable entity with lower tax rates than the highest marginal individual rates. This rate differential has provided taxpayers with a powerful incentive to accumulate earnings in corporations rather than to distribute them in the form of dividends that would then be taxed at the higher graduated personal rates. Historically, the accumulated earnings tax, which has existed in some form since 1913, has been the principal weapon against such accumulations.

As with any law, those who write it, those who enforce it, and those who are subject to it are interested in knowing the factors that determine how the force of the law is ultimately imposed. In the case of the accumulated earnings tax, these parties are Congress, the Treasury Department, and taxpayers.

There are at least three stages in the enforcement process that might be studied in order to determine the factors of interest to these parties. The first stage would be the point at which taxpayers are audited for possible accumulated earnings liability, the second the point at which taxpayers actually receive assessments from the Internal Revenue Service, and the third the point at which cases are decided in court. While it would clearly be interesting to study the enforcement process at the audit and assessment stages, data are not publicly available. Reported decisions for cases tried in

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court are available, however, and form the basis for this study.

Because the accumulated earnings tax is not self-assessed, these cases tried in court should encompass a much greater portion of the imposition of the tax than for taxes having a high level of voluntary compliance. Thus, while a study of this final stage of the enforcement process cannot answer all the questions of interested parties, it has the potential to identify some of the factors important in discriminating winning from losing taxpayers.

Taxpayers and other interested parties traditionally have used legal research techniques to analyze cases tried in court. Thus, examination of decided cases in order to identify trends as well as individual differences or similarities is not a new approach. This study was designed to supplement traditional methods using an appropriate statistical technique[1] in order to identify the variables that discriminate cases won by the taxpayer from cases lost by the taxpayer. In this way, relationships not revealed by legal research might be identified, and avenues for further research revealed. In addition, this type of analysis seems particularly useful to those who are interested in a broader look at the application of the law rather than in its application to a particular taxpayer.

BACKGROUND OF THE TAX

Originally, under the Tariff Act of 1913, the shareholder was taxed on a rateable share of the corporate income (whether distributed or not) where there was evidence of accumulation beyond the reasonable needs of the business. In 1921, this approach was abandoned. The tax became a penalty tax imposed on the corporation where unreasonable accumulation was found.

The statute was steadily strengthened from 1921 until 1938, reflecting Congressional concern that taxpayers were using corporations to shield themselves from the personal income tax. Following World War II, taxpayer fear of renewed enforcement of the tax brought about many criticisms [Hall, 1952, pp. 9–11]. Congress responded in 1954 with major revisions, all in the taxpayer's favor. There have been no substantive changes in the tax since the 1954 revisions.

In its present form, the tax is imposed on the corporation's "accumulated taxable income" at the rate of 27½ percent of the first $100,000 and 38½ percent of accumulated taxable income in excess of $100,000. Internal Revenue Code Section 535 defines accumulated taxable income as the corporation's taxable income (with certain adjustments intended to reflect more accurately the corporation's dividend-paying capacity) minus the sum of the dividends-paid deduction of Section 561 and the accumulated earnings credit of Section 535(c). The accumulated earnings credit was added in 1954 to protect small businesses from fear of the tax [*House Report 1337*, 1954, p. 54]. The credit was originally $60,000 [*Senate Report 1622*, 1954, p. 72], but has been increased twice, first to $100,000 in 1958 and then to $150,000 in 1975. Accumulations in excess of $150,000 may escape the tax to the extent that reasonable business needs for the funds can be demonstrated by the taxpayer.

FOCUS OF THE STUDY

The Cases

Tax cases can be tried in the Tax Court, the federal district courts, or in the Court of Claims. Approximately half of all post-1954 accumulated earnings cases have been tried in the federal district courts and half in the Tax Court. Only three have been tried in the Court of Claims.

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[1] Over 20 years ago statistical analysis was first applied to Supreme Court cases (see, for example, Kort [1957]). Such analysis has only recently been applied to tax cases (see, for example, Englebrecht [1977]).

There are several reasons why Tax Court and district court cases ought not to be mixed for purposes of analysis as if they were homogeneous. First, the taxpayer proceeding into the district courts must pay the assessed tax in advance while the taxpayer proceeding into the Tax Court is not required to do so. In addition, a jury trial is not available in the Tax Court as it is in the district courts. Given these differences, there is reason to believe that there may be differences in the type of taxpayer who opts for one court over another. In fact, Weithorn and Noall [1968, pp. 198–199] have suggested that a taxpayer with a weak case may have a better chance of winning in the district courts. Further, there is some reason to believe that the expertise of Tax Court judges may produce better quality decisions.

The reasons for choosing Tax Court cases as a basis for analysis were pragmatic ones. In general, the published Tax Court opinions provide much more complete information than do district court cases. Some district court opinions, for example, contain only brief instructions to a jury. To obtain data for these cases, one would have to purchase records of the trials from the districts in which they were heard. Tax Court cases were therefore considered more suitable than district court cases for an initial exploratory study.

All 67 post-1954 accumulated earnings cases litigated in the Tax Court initially were considered for analysis. Eight of the cases were excluded, six because they dealt with narrow issues related to the accumulated earnings tax but did not directly address the applicability of the tax and two because the final decisions were not known. Thus, with these minor exceptions, the analysis includes the entire population of accumulated earnings cases tried in the Tax Court through mid-1976. These 59 cases encompass tax years from 1954 through 1970.

Classification of the Cases

In a typical accumulated earnings case, the taxpayer corporation has received a deficiency notice for two or three taxable years. Thus, it would be possible either to treat each year or each case as a single observation. The second treatment was adopted because of the lack of independence of one year from the next in any given case.

Several methods of classifying these cases are possible. For example, taxpayers could be classified as "winners" or as "losers" based on the percentage of the assessment paid by the taxpayer over all years involved. This approach would prevent a case in which the taxpayer paid a very small percentage of the assessment from being classified as a "loser." Unfortunately, this precision cannot always be achieved. Under Tax Court Rule 155, where the court has filed its opinion on the issues in a case, it may withhold its decision for the purpose of allowing the parties to submit computations. In cases in which determination of the decision is delayed, the printed opinion will note, "Decision will be entered under Rule 155." Thus, where the taxpayer is subject to the tax, the amount of tax owed cannot always be determined by reading the printed opinion.

Because of this inability to determine the amount of tax owed in every case, an alternative classification scheme was adopted. The 59 cases were divided into three groups: "winners" (Group 1), 27 cases in which the taxpayer paid no tax for any of the litigated years; "losers"

(Group 2), 26 cases in which the taxpayer paid some tax for each litigated year; and "split decisions" (Group 3), six cases in which the taxpayer paid some tax for at least one, but not all, litigated years. Cases which had been appealed were classified according to the final decision known.

The Discriminating Variables

One major source of important variables is the regulations associated with the accumulated earnings tax. Regulations are written by the Treasury Department and may be either "interpretive" or "legislative" (*i.e.*, specifically authorized in the associated Code section). Legislative regulations clearly carry the force of the law. Interpretive regulations which have long been in effect without substantial change (the accumulated earnings regulations were approved in 1959) and are clearly consistent with the statute also carry the same force as the law itself.

A second possible source of important variables is the Internal Revenue Service Audit Guidelines [Internal Revenue Service, 4(12) 10-10]. These Guidelines were first published in their entirety in 1975 as a result of various legal actions following the passage of the 1967 Freedom of Information Act, although they may have been available previously to some taxpayers and their advisers through such informal sources as former IRS employees.

The variables examined from the cases included in this study were drawn from the two sources discussed above: the regulations [§§ 1.533-1(a)(2), 1.537-2(b), 1.537-2(c)] and the IRS Audit Guidelines related to the accumulated earning tax. All of the variables found in the regulations are repeated in some way in the Audit Guidelines. There are, however, several factors mentioned in the Guidelines which are not found in the regulations. The regulations yielded a list of 14 potential variables. The Audit Guidelines added 12 variables to the list.

Because of the large number of potential variables relative to the number of cases, some of the variables were eliminated from consideration on one of three bases. First, where two variables were highly correlated, the variable with the smaller amount of missing data was retained. Second, where a variable was present in only one or two cases and thus had little potential for differentiating among the three classes of cases, the variable was eliminated. Third, three types of unrelated loans (loans to stockholders, loans to friends and relatives of stockholders, and loans to unrelated corporations controlled by the same stockholders) were combined into one composite variable.

These eliminations and combinations resulted in a final list of 18 variables. A nineteenth variable, "missing data," was added to determine whether the tendency to have missing data followed some nonrandom pattern (see Cohen and Cohen [1975, p. 286]). One might expect, for example, to find more missing data in losing cases. Table 1 summarizes the variables selected for analysis, the sources from which they were drawn, and whether the presence or absence of the variable is considered indicative of excess accumulation in the regulations and/or Guidelines.

The expected effect of any given variable on a taxpayer's case can be unambiguously specified from reading the regulations and Audit Guidelines. Two factors make these specifications deceptive for purposes of research, however. First, the variables are not considered alone but in combination with other variables. Thus, a taxpayer corporation's loans to a stockholder, for example, may be offset by other variables considered

TABLE 1

SUMMARY OF VARIABLES

Variable Name	*Authoritative Source*	*Presence Favorable to Taxpayer**
1. Plans to expand or replace assets	Reg./IRS	yes
2. Plans to diversify	Reg./IRS	yes
3. Current ratio	Reg./IRS	**
4. Contingencies	Reg./IRS	yes
5. Related investments	Reg./IRS	yes
6. Related loans	Reg./IRS	yes
7. Unrelated investments	Reg./IRS	no
8. Unrelated loans	Reg./IRS	no
9. Dividend history	Reg./IRS	yes
10. Dividend payout	Reg./IRS	**
11. Long term debt	Reg./IRS	yes
12. History of expansion	IRS	yes
13. Documentation of plans	IRS	yes
14. Fulfillment of plans	IRS	yes
15. Actual diversification	IRS	yes
16. Short term investments	IRS	no
17. Salary to stockholders	IRS	yes
18. Stock redemptions	IRS	no
19. Missing data		

* For dichotomous variables.

** Winning taxpayers would be expected to have a low current ratio and a high dividend payout.

more important by the court. Second, the relative importance of the variables may not be the same at all levels of the enforcement process. Suppose, for example, that a particular attribute is considered extremely important by the IRS. The presence of this attribute might "flag" a case for audit and ultimately lead to an assessment where the case against the taxpayer is otherwise rather weak. In such a situation, it is possible that the attribute may *appear* to be helpful at the trial level. Consequently, it is actually quite difficult to specify *a priori* what the apparent effect of an attribute will be in a multivariate statistical analysis without knowing other factors in the case and without knowing the relative importance placed on these factors by the IRS and the courts.

The variables in Table 1 and their expected impact on a taxpayer's case have, to differing degrees, all been discussed previously in the tax literature. There is, in fact, a rather extensive body of literature related to the accumulated earnings tax, most of it based on the traditional methods of legal research. In spite of the large number of published articles, relatively few clear-cut guidelines have emerged. Tax experts have been almost unanimous in their agreement as to the importance of documentary plans (see, for example, Altman [1964]; Monyek [1969]; and Schweitzer [1975) and avoiding unrelated loans (see, for example, Faber [1967]; Kirby [1970]; and Peterson and Beatty [1964]). There has been far less agreement as to the importance of unrelated investments, stock redemptions, diversification, dividend history, debt retirement, and the other factors found in the regulations and IRS Audit Guidelines. Faber [1967, p. 276] suggests, for example, that stock redemptions may be a damaging factor in an accumulated earnings case, but Ziegler [1966, pp. 110–115] notes that the courts may be taking a more liberal attitude where sound business purpose is demonstrated. One factor in particular, the payment of salary to stockholders who participate in the management of a corporation, has been almost ignored by the experts. The present study was in part an effort to determine if a statistical analysis of court cases could reveal patterns not previously detected by more traditional methods.

RESEARCH METHOD

The primary purpose of this study was to identify the variables that have discriminated winning from losing accumulated earnings cases in the Tax Court. For most of the period covered by this study, the regulations were the only published guidelines available to taxpayers and to the courts. Thus, one aspect of the study was a comparison of the discriminatory power of these published variables with that of the unpublished IRS variables. The results of this aspect of the study should be of particular interest to policymakers and those who wish to influence them. Perhaps of greater interest to individual taxpayers would be the rankings of the variables in terms of discriminatory power and the consistency or lack thereof with the sources from which they are drawn.

The statistical tool selected to analyze these cases was multiple linear discriminant analysis, which seeks to find linear combinations (discriminant functions) of a set of variables that best differentiate among several groups. The maximum number of discriminant functions that can be obtained is the smaller of (1) the number of groups minus one or (2) the number of variables. Classification functions for each group can be derived using the discriminant functions. These classification functions yield for each case the probability that it belongs to a particular group. The case is then assigned to the group with the largest classification score.

To ensure that the transformation is linear, the population should satisfy two conditions: (1) the discriminating variables should have a multivariate normal distribution, and (2) they should have equal dispersion matrices within each group. In this study, the normality assumption was violated by the introduction of discrete variables. Several studies have shown, however, that linear discriminant analysis can perform well under this circumstance [Gilbert, 1968; Krzanowski, 1975]. In regard to the second assumption, if the dispersion for one group is larger than that of another, the group with larger dispersion will tend to have more cases assigned to it given equal prior probability of membership [Cooley and Lohnes, 1971, p. 267]. A test of the equality of the group dispersion matrices [Kendall and Stuart, 1968, pp. 266 and 382] was calculated for each analysis performed using the Statistical Analysis System [Barr *et al.*, 1976, pp. 98–101]. The tests showed no evidence of inequality. Therefore, the discriminant analyses were performed under the assumption of equality of dispersion matrices; *i.e.*, a pooled covariance matrix was used in the calculation of the discriminant functions.

A stepwise discriminant analysis [Nie *et al.*, 1975, pp. 276–298] was employed to determine which variables were significant discriminators between winners and losers. Since this procedure selects variables in the order of their ability to discriminate, the rank order of the most important variables is also obtained. The program employed permits a Bayesian adjustment of the probability of group membership. This study included virtually all post-1954 Code accumulated earnings cases tried in the Tax Court. Classification results were therefore adjusted to reflect prior probabilities proportional to the number of cases in each group.

Of the 19 variables included in the analyses (see Table 1), two ("current ratio" and "dividend payout") are continuous; all others are discrete. The value of the variable "missing data" indicates the number of variables on which data are missing for each case. The range of values for missing data is from 0 to 6. All other discrete variables are dichotomous. In these cases, the presence of the measured attribute resulted in the assignment of a value of 1, while the absence was assigned a value of 0.

Determination of the value of the variables required a number of decision rules. For dichotomous variables such as "salary to stockholders," a decision was made to assign a value of 1 only when the presence of the attribute was explicitly mentioned in the case and a value of 0 only when the absence of the attribute was explicitly mentioned. This rule resulted in a larger amount of missing data than would have existed had the variables been assigned values according to presence or absence of the factor being measured. This cost was traded off against the possible bias that would have been introduced had cases with no mention of the attribute been automatically assigned a value of 0. The former problem was deemed to be less severe than the latter. Where data were missing, the mean of values which were present was "plugged" for missing values (see Jackson [1968]).

Several other of the decision rules which were adopted may require explanation. "Plans to expand or replace assets" and "plans to diversify" were coded as present whenever the taxpayer relied on such plans (regardless of how vague or indefinite) as a defense. "Dividend history" was assigned a a value of 0 if the corporation had never paid *any* dividend during its history (approximately 40 percent had not). "Dividend payout" was the average payout as a percentage of after-tax income for the litigated years. A "history of expansion" was regarded as present in the case if specific mention was made of such expansion or if balance sheets presented showed a steady pattern of growth in assets. A code of 0 was assigned when no growth was apparent from the balance sheets, when an erratic pattern was present, or when the corporation was no longer actively engaged in carrying on a business. "Fulfillment of plans" was assigned a value of 1 whenever the plans had been carried out, either in part or in full, prior to the court appearance.

Dichotomous variables were used extensively in the study to minimize missing data problems. With only 59 cases and a large number of variables, every effort was made to include all of the available cases in the study. For most of the cases it would have been possible to quantify "related investments," "related loans," "unrelated investments," "unrelated loans," "long term debt," "short term investments," and "salary to stockholders." The problem was how to scale these variables so that valid comparisons could be made between equivalent variables for large and small companies.

Some possible ratio denominators which would have taken into account the size of the taxpayer corporations were total assets, total income or sales, and accumulated earnings. Each of these choices offered some advantages and disadvantages, but all had in common the fact that they were not available for all cases. The maintenance of the sample size was viewed as critical enough to reject any choice that would sacrifice more than a few cases. The only amount available for all cases was the amount of the IRS assessment, and it did not seem to be a suitable scaling factor for two reasons. First, there is no necessary relationship between size of the assessment and size of the company. Second, the focus of the study was on the decision of the court, not on the assessment process. Thus, the choice was made to employ dichotomous rather than continuous variables for the seven factors mentioned above.

A two-phase analysis was performed, with the first phase including only the regulation variables and the second including the IRS Audit Guidelines. It should be recalled that the Audit Guidelines encompass all the regulation variables plus seven additional ones. The first phase is of interest in that it reveals the ability of the regulation variables alone to discriminate among the groups. The second phase reveals the extent to which the additional variables found in the Audit Guidelines add discriminatory power. The second phase also provides a ranking in terms of discriminatory power of all the variables.

RESULTS

Analysis Based on the Regulations

Table 2 presents the standardized discriminant function coefficients obtained when discriminant analysis was performed on all 59 cases using only the regulation variables. These functions are the linear combinations of the variables that best differentiate among the groups. Six variables ("plans to expand," "plans to diversify," "related investments," "related loans," "dividend payout," and "missing data") did not make a sufficient contribution to discriminating among the groups to be retained by the stepwise procedure. Those variables whose coefficients have the largest absolute size made the greatest contribution to the discriminant functions.

TABLE 2

STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS USING REGULATION VARIABLES

Variable	*Function 1*	*Function 2*
Current ratio	−0.35967	0.13228
Contingencies	0.47243	−0.31732
Unrelated investments	−0.10328	−0.32238
Unrelated loans	0.37496	−0.67071
Dividend history	0.19972	0.26848
Long term debt	0.41901	0.81496
Relative percentage	55.53%	44.47%
Wilks' Lambda	.3427	.6129
Chi-square	57.295	26.187
Degrees of freedom	12	5
Significance	.0000	.0000

Under the assumptions of a multivariate normal distribution and equal dispersion matrices, a probaility of group membership can be assigned to each case. The cases can then be classified into the group with the largest probability. When the cases in this study were classified based on the regulation variable analysis, approximately 78 percent were correctly classified (see Table 3).[2]

TABLE 3

CLASSIFICATION RESULTS USING REGULATION VARIABLES

Actual Group	*Number of Cases*	*Predicted Group Membership*		
		Group 1	*Group 2*	*Group 3*
1	27	20 74.1%	6 22.2%	1 3.7%
2	26	4 15.4%	22 84.6%	0 0.0%
3	6	1 16.7%	1 16.7%	4 66.7%

Percent of cases correctly classified: 77.97%

Analysis Based on IRS Audit Guidelines

The second phase of the analysis was to perform discriminant analysis on the same cases using the IRS Audit Guidelines. These variables encompass all of the variables drawn from the regulations. One regulation variable, "plans to diversify," was eliminated because it was highly correlated with the variable "actual diversification." Table 4 presents the standardized discriminant functions obtained when stepwise discriminant analysis was performed using these variables. Figure 1 depicts graphically the separation obtained from reducing the 19 original variables to the two discriminant scores for each group (the asterisks repre-

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[2] In contrast, random, independent assignment of cases to groups based on their proportional representation in the population yields an expected correct classification of less than 42 percent.

TABLE 4

STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS USING IRS AUDIT GUIDELINE VARIABLES

Variable	*Function 1*	*Function 2*
History of expansion	−0.29637	−0.13172
Plans to expand or replace	0.18391	0.08263
Documentation of plans	−0.43962	0.35967
Fulfillment of plans	−0.01051	−0.39037
Actual diversification	−0.28201	−0.12498
Current ratio	0.15287	−0.21217
Short term investments	−0.17305	0.15733
Contingencies	−0.17137	0.39902
Unrelated investments	0.15203	0.23170
Salary to stockholders	−0.37314	−0.16192
Unrelated loans	−0.17303	0.53228
Long term debt	−0.26680	−0.43587
Relative percentage	76.80%	23.20%
Wilks' Lambda	.1444	.5445
Chi-square	97.718	30.701
Degrees of freedom	24	11
Significance	.0000	.0010

sent the mean discriminant scores for each group). Winning taxpayers (Group 1) are characterized by negative scores on Function 1 (horizontal axis), while losing taxpayers (Group 2) are characterized by positive scores. The five variables from Function 1 making the greatest contribution to discriminating between winners and losers were "documentation of plans," "salary to stockholders," "history of expansion," "actual diversification," and "long term debt." All have negative standardized discriminant function coefficients. Thus, winners could be characterized as possessing these attributes.

Table 5 presents classification function coefficients for the three groups. These functions yield for each case the probability that it belongs to a particular group. The case can then be assigned to the group with the largest classification score. These coefficients are not standardized and thus cannot be used to compare one variable with another as can the discriminant function coefficients in Tables 2 and 4. They are, however, useful in measuring the effect of a particular variable across groups. A combination of these results with those of Table 4 reveals how the more important discriminating variables differentiated among groups. For example, the variable "documentation of plans" was the most important discriminating variable in Function 1 (Table 4). The classification functions shown in Table 5 indicate that a winning taxpayer was far more likely to have documented plans than a losing tax-

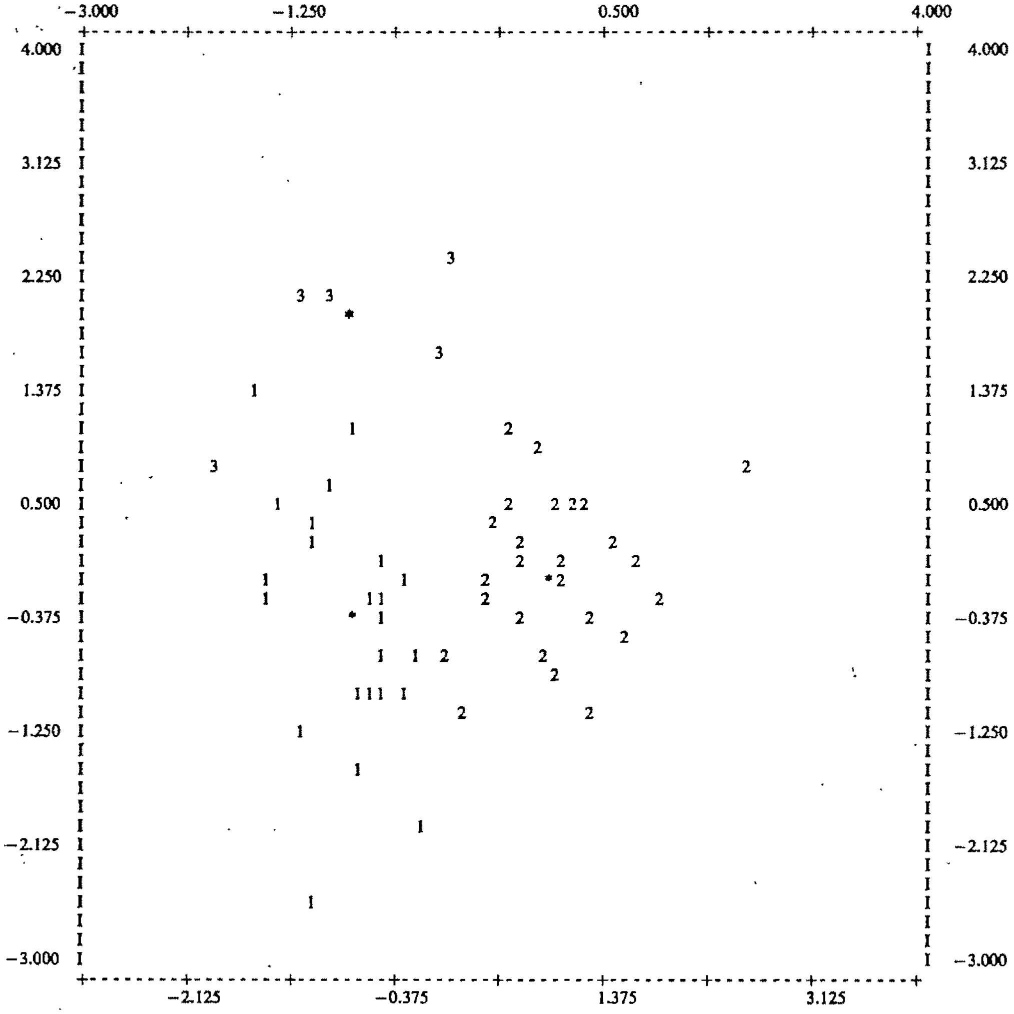
TABLE 5

CLASSIFICATION FUNCTION COEFFICIENTS USING IRS AUDIT GUIDELINE VARIABLES

Variable	*Group 1*	*Group 2*	*Group 3*
History of expansion	9.68096	5.53334	8.24491
Plans to expand or replace assets	−1.10902	1.79389	−0.09553
Documentation of plans	7.63622	2.42594	10.25544
Fulfillment of plans	−3.80373	−4.43503	−6.99539
Actual diversification	11.59100	4.97032	9.30358
Current ratio	−0.03663	0.02508	−0.09646
Short term investments	8.18478	5.79228	9.55634
Contingencies	2.61199	0.64201	6.34796
Unrelated investments	−2.13717	0.45238	0.24947
Salary to stockholders	15.28403	8.34979	12.92597
Unrelated loans	1.64175	0.13207	5.89790
Long term debt	6.21731	2.10831	2.21513
Constant	−18.50316	−6.67696	−20.65154

FIGURE 1

PLOT OF DISCRIMINANT SCORE 1 (HORIZONTAL) VERSUS DISCRIMINANT SCORE 2 (VERTICAL) BASED ON IRS AUDIT GUIDELINES



payer and that a split decision taxpayer was more likely than either winners or losers to have such plans.

Table 5 also reveals that three variables ("unrelated loans," "plans to expand or replace," and "marketable securities") discriminated in a manner contrary to that intended by the regulations and/or IRS Audit Guidelines. Winning taxpayers were actually more likely than losing taxpayers to have made unrelated loans and to have marketable securities among their assets. On the other hand, losing taxpayers were more likely to have presented plans to expand or replace assets as a defense.

Classification based on the IRS variables produced better results than was the case with the regulation variables alone. Over 94 percent of the cases were correctly classified. These results are presented in Table 6. A comparison of

TABLE 6

CLASSIFICATION RESULTS USING IRS AUDIT GUIDELINE VARIABLES

Actual Group	Number of Cases	*Predicted Group Membership*		
		Group 1	*Group 2*	*Group 3*
1	27	26 96.3%	0 0.0%	1 3.7%
2	26	1 3.8%	25 96.2%	0 0.0%
3	6	1 16.7%	0 0.0%	5 83.3%

Percent of cases correctly classified: 94.92%

Tables 2 and 4 reveals that the IRS variables which contributed most to this improved ability to classify the cases were "documentation of plans," "salary to stockholders," "history of expansion," and "actual diversification."

Comparison of Winning Cases with Losing Cases

An interesting insight into the nature of the two discriminant functions can be obtained by classifying the cases based only on Discriminant Function 1 (Table 4). These results, shown in Table 7, and also apparent in Figure 1, reveal that Function 1 separates winners and split decisions from losers with only one misclassification. Discriminant Function 2 apparently serves to separate split decision cases from winners. The two most important variables in Function 2 are "unrelated loans" and "long term debt." Split decision taxpayers were more likely to have made unrelated loans and less likely to have relied on long term debt. Both of these are characteristics that would be expected to hurt a taxpayer's chance of winning an accumulated earnings case. Because of the small size of Group 3 (only six cases), it is probably not valid to make generalizations concerning this group. It does appear, however, that split decision cases are closer to being winners than losers.

TABLE 7

CLASSIFICATION RESULTS BASED ON DISCRIMINANT FUNCTION 1 USING IRS AUDIT GUIDELINE VARIABLES

Actual Group	Number of Cases	*Predicted Group Membership*		
		Group 1	*Group 2*	*Group 3*
1	27	27 100.0%	0 0.0%	0 0.0%
2	26	1 3.8%	25 96.2%	0 0.0%
3	6	6 100.0%	0 0.0%	0 0.0%

The major emphasis of this study is on the factors that separated winners from losers. These are the variables in Discriminant Function 1. Table 8 lists these factors in order of decreasing discriminatory power and provides their source and classification function coefficients. The variables making the greatest contributions to discriminating between winning and losing taxpayers in accumulated earnings cases were (in order of weight) "documentation of plans," "salary to stockholders," "history of expansion," "actual diversification," and "long term debt." In each case, the variable performed as expected.

Most taxpayers in the study *claimed* "plans to expand" as a defense. In fact, losing taxpayers were more likely to have made this claim. Taxpayers who won, however, were those who could support this claim with documentation and/or a history of expansion.

The presence of salary payments to stockholder/officers may have helped mitigate an image of a corporation hoarding its earnings to protect them from the personal income tax to which they are

TABLE 8

SUMMARY OF CLASSIFICATION RESULTS FOR GROUPS 1 AND 2 USING ALL VARIABLES

*Variables Listed in Order of Discriminant Function Weight**	*Source*	*Classification Function Coefficients*	
		Group 1	*Group 2*
Documentation of plans	IRS	7.63622	2.42594
Salary to stockholders	IRS	15.28403	8.34979
History of expansion	IRS	9.68096	5.53334
Actual diversification	IRS	11.59100	4.97032
Long term debt	Reg./IRS	6.21731	2.10831
Plans to expand or replace	Reg./IRS	−1.10902	1.79389
Short term investments	IRS	8.18478	5.79228
Unrelated loans	Reg./IRS	1.64175	0.13207
Contingencies	Reg./IRS	2.61199	0.64201
Current ratio	Reg./IRS	−0.03663	0.02508
Unrelated investments	Reg./IRS	−2.13717	0.45238
Fulfillment of plans	IRS	−3.80373	−4.43503
Variables Not in Analysis			
Related loans	Reg./IRS	=	=
Stock redemptions	IRS	=	=
Dividend payout	Reg./IRS	=	=
Related investments	Reg./IRS	=	=
Dividend history	Reg./IRS	=	=
Missing data	=	=	=

* The variables are listed in order of decreasing absolute value of discriminant function weights as presented in Table 4.

subject when distributed. This is especially likely given the low (ten percent) average dividend payout for the corporations studied.

Apparently, the Tax Court has recognized diversification into new lines of business as a legitimate use of funds. The dividing line between diversification and unrelated investment is not always clear, but it seems to focus on the degree of control exercised by the acquiring corporation [Reg. § 1.537-3].

Finally, the use of borrowed funds may have indicated to Tax Court judges that the assets accumulated in the corporation are needed and should not be distributed in the form of dividends. Alternatively, the absence of any use of long term borrowed funds may have indicated a high level of liquidity to the court.

In general, these results are not surprising based both on the sources from which the variables were drawn and on the tax literature. Of the five most important variables, the payment of salaries has received the least attention. While the decisions included in this study are dated through mid-1976, only one of the cases involved a tax year after 1969. The 50 percent maximum tax on personal service income (instituted in the 1969 Tax Reform Act) may make payment of salaries a particularly appealing method of avoiding the accumulated earnings tax. Of course, taxpayers who do so must also consider the possibility that the salaries paid may be considered excessive by the IRS. This problem is certainly of greater concern to the IRS now than it was during the tax years encompassed in these cases.

In addition to the importance of salaries as a discriminating variable, several other surprising results emerged. Three variables ("plans to expand or replace assets," "unreleated loans," and "short term investments") all contributed to discriminating winners from losers but in a manner contrary to that intended by the regulations and Audit Guidelines. While it is clear from the regulations that "plans to expand or replace assets" is an acceptable reason for accumulating assets, the results of this study imply that many taxpayers made this claim without supporting evidence. Thus, the counter-intuitive results obtained make sense when other variables are taken into account. "Unrelated loans" and "short term investments" are both considered to be evidence of excess accumulations. Quite possibly, as discussed earlier, these variables are very important to the IRS in selecting taxpayers for audit and assessment. Thus, taxpayers with otherwise convincing cases may wind up in court where these variables are apparently less important to Tax Court judges than other variables considered in the study.

Although the primary purpose of the study is to identify the variables that have discriminated winning from losing accumulated earnings cases in the Tax Court, a secondary aspect of the study is a comparison of the discriminatory power of the regulations with that of the unpublished Audit Guidelines. The results of the analyses reveal that the regulation variables have had relatively less discriminatory power than the Guidelines. Of the ten regulation variables, four did not make a sufficient contribution to be retained in the analysis. The variables "current ratio," "contingencies," "unrelated investment," and "long term debt" are the only regulation variables that contributed to Discriminant Function 1 and performed as expected. Of these variables, only "long term debt" was among the five most important. The two remaining regulation variables, "plans to expand or replace assets" and "unrelated loans," both discriminated in a manner opposite to that intended by the regulations.

Probably the best explanation for the superior discriminatory power of the IRS Guidelines is that taxpayers were better able to adapt to the published regulations than they were to the unpublished Audit Guidelines. Thus, taxpayers were more likely to be "caught" by the factors of which they were ignorant.

LIMITATIONS OF THE STUDY

Conclusions based on the analyses here do not necessarily apply to accumulated earnings decisions in the district courts or the Court of Claims. A possible extension of this study would be to apply the same analyses to district court cases to determine if there are indeed differences in the important discriminating variables and in the taxpayers who choose these courts rather than the Tax Court. The inadequacy of published data for purposes of analysis would almost certainly require the researcher to obtain court records for these cases.

The study was also limited in that it was based on cases tried in court (the only available published data). There are many opportunities prior to a court appearance for the parties to compromise. Taxpayers with weak cases may be more likely to compromise than to proceed into court. On the other hand, such taxpayers may feel that they will have a more sympathetic hearing from a judge than from IRS representatives. Given the lack of available data, one can only speculate as to the possible bias introduced by limiting the study to cases tried in court.

It is also possible that the Tax Court has based its decisions on some factors not mentioned in either the regulations or the IRS Audit Guidelines. One such factor is the skill and expertise of the attorneys involved in representing the positions of the government and the taxpayer corporation. Additionally, the study was based on the printed opinions of Tax Court judges. These opinions are, in effect, justifications for the decisions of the court and may select from available materials those factors which support the decision. Analysis of the complete record of each trial would be far more expensive and time consuming than an analysis of printed opinions, but such analysis might yield additional or less biased information.

Finally, it should be recalled that the cases analyzed were drawn from a 20-year time period. While this pooling was necessary in order to have an adequate number of cases to work with, it requires an implicit assumption of stationarity of the relationships among the variables over time. Given this assumption, predictions about the future should be made with caution.

SUMMARY AND CONCLUSIONS

The analyses revealed that the variables drawn from the regulations and IRS Audit Guidelines are capable of discriminating winning accumulated earnings cases from losing cases. The regulation variables did not, however, prove to be more powerful discriminators than the variables included only in the IRS Audit Guidelines. The IRS variables are an expanded set, including the regulation variables. One would expect the larger set to provide additional discriminatory power. It is important to note, however, that these added variables contributed more than a marginal improvement. The four most important discriminating variables in separating winning from losing taxpayers were all drawn exclusively from the IRS Audit Guidelines.

The results of this study are based on statistical analysis. Several variables and patterns not detected by more traditional analysis emerged. First, the payment of salaries to stockholders was an important variable in discriminating winning taxpayers from losing taxpayers. Second, taxpayers have often been advised to get rid of unrelated loans (see Faber [1967, p. 276]) or to avoid holding marketable securities (see Peterson and Beatty [1964, p. 134]). While such advice may be helpful in avoiding assessments, the evidence presented here is that it has not necessarily contributed to winning cases in court. On the contrary, taxpayers who won in court actually were more likely to have made unrelated loans or to have held marketable securities among their assets.

The results of this study have implications for each of the three groups previously mentioned. Of these groups, the IRS has access to the most information and thus may already be aware of the relationships revealed by the study. The factors that discriminated in a contrary manner should be of particular interest if they are important in the audit selection process. Perhaps the IRS should reconsider their usefulness as indicators of excess accumulations, at least for cases that go to court.

Taxpayers should be interested in the important variables and their rankings. Some of the factors (such as history of expansion and the presence of contingencies) do not lend themselves to planning. Other factors (such as documentation of plans, payment of salaries, and the use of long term debt) can be planned by taxpayers who believe they are vulnerable to the tax. Additionally, the three factors that discriminated in a contrary manner should not be ignored by taxpayers. Plans to expand or to replace assets have required supporting evidence in the form of documentation, a past history of expansion, or fulfillment of plans. Clearly taxpayers have not been able to rely on plans alone as a successful defense. The presence of unrelated loans and short term investments quite likely are important variables in the process employed by the IRS in selecting returns for audit. Taxpayers, therefore, should be aware that while these factors have not necessarily been damaging in court, they may have contributed to the costly process of getting there.

Finally, the results of the study should be of interest to Congress and to those who wish to influence Congress. While some taxpayers may have had access through informal channels to the IRS Audit Guidelines during the period studied, not all did. The study indicates that at least in the Tax Court the Audit Guidelines have proved to be more powerful and consistent discriminators than the regulations. Thus, for most of the period covered, taxpayers and their advisers did not have free access to the best source of discriminating variables. Instead, they may have relied on the regulations which in some respects have actually been misleading as predictors of success in court. Of course, these relationships were impounded in the court cases that were being decided during this time, but tax experts continued to emphasize the importance of the regulations as guidelines to taxpayers.

The evidence here is that taxpayers were more likely to run afoul of the unpublished IRS Audit Guidelines. If one assumes that some but not all taxpayers have access to such unpublished sources through informal channels, then one policy implication is that fuller disclosure of these sources is desirable. Now that the Audit Guidelines are available, they deserve the close attention of taxpayers and their advisers.

Further, if the Tax Court reliance on the Audit Guidelines seems reasonable to the Treasury Department and if further research reveals similar reliance in the district courts, then perhaps these variables should be incorporated into the regulations. The regulations are regarded as possessing the same authority as the Code itself. At a minimum, the regulations should not be misleading. Ideally, they should provide taxpayers with realistic guidelines as to how they can expect a Code section to be enforced.

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An Empirical Inquiry into the Role of the Tax Court in the Valuation of Property for Charitable Contribution Purposes

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ABSTRACT: Several commentators have examined the valuation process for property and closely held stock in estate, gift, and income tax cases in the federal courts. Examination of court determined values led many to conclude that the courts do not actually value property or closely held stock but rather serve as compromisers between the two opposing parties in litigation. The implications for tax counsel and public policy are extremely significant if this charge is supported by fact. The major purpose of this study is to demonstrate statistically that the Tax Court does not act in a manner consistent with a "compromiser model" in federal income tax valuations of property for charitable contribution purposes. A simple regression model is used to test the relationship between the Tax Court determined values and a compromise value—the arithmetic mean of taxpayer and IRS value estimates. In addition, *chi*-square analysis indicates that the Tax Court did not value one type of property more strictly or generously than other types.

RECENTLY, the role of the Tax Court in the valuation of closely held stock was the subject of an empirical investigation [Englebrecht, 1977, pp. 97–113]. That study was concerned with valuation for federal estate and gift taxation, and "provided important empirical evidence to support the theory that the Tax Court acts as an arbitrator" [p. 110]. On the other hand, however, the issue of the Tax Court acting as an arbitrator, rather than a trier of fact, in other circumstances where valuation is an issue has yet to be addressed. For instance, there are numerous situations where valuation of property is difficult but important for the purpose of determining the liability of the taxpayer. In particular, the charitable contribution deduction permitted by Section 170 of the Internal Revenue Code of 1954 is determined on the basis of fair market value when property other than money is contributed. Consequently, the charge that the Tax Court acts as a compromiser when valuing property for charitable contributions is of paramount importance because it casts a pall over the entire guideline system.[1] As Bosland

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[1] The guidelines used in valuing property and closely held stock, for charitable contribution purposes and estate and gift tax purposes, are found in the Internal Revenue Code, Treasury Regulations, and Administrative Rulings.

[1963, p. 88] noted, "... a tendency to compromise defeats justice when it is substituted for a rigorous application of basic valuation principles."

The major objective of this study is to generate empirical findings in order to assess the charge that the Tax Court acts as an arbitrator or compromiser when valuing charitable contributions property for federal income tax purposes. A simple regression model is used to appraise the relationship between Tax Court determined values and a compromise value—the arithmetic mean of taxpayer and IRS value estimates. Additionally, a *chi*-square analysis tests the consistency of decided values among specific categories of property. The results of this test will indicate whether or not the Tax Court values one type of property more strictly or more generously than other types.

BACKGROUND

The Deduction

The charitable deduction was initiated in 1917 to stimulate donations to charitable organizations [Griswold & Graetz, 1976, p. 438]. As a consequence of installing the deduction, the government faced a twofold dilemma—the deduction supports organizations which benefit the public, but provides a legitimate means of tax avoidance to persons making such contributions. Compromise between allowing generous deductions and limited deductions has been very evident in recent legislation. For example, the Tax Reform Act of 1969 removed the unlimited deduction which had been available to certain taxpayers, but increased the deduction limitation from 20 percent to 50 percent of the adjusted gross income for many other taxpayers [P.L. 91-172, Sec. 201(a)(1)]. More recently, in Sec. 301 of the Tax Reform Act of 1976, an indirect attack was made on the large contribution by designating itemized deductions (excluding medical and casualty loss) as tax preference items, to the extent that they exceed 60 percent of adjusted gross income [IRC Sec. 57(b)]. Congress has been hesitant to upset the financial sources for charitable organizations, but at the same time is concerned with the revenue loss through tax avoidance.

Contributions of Property

Contributions of property, other than money, pose special problems. Where IRC Sec. 170 refers to contributions of property, the starting point for determining the deduction is fair market value at the time of the contribution. The section offers no guidelines to assist the taxpayer in determining fair market value, so it is necessary to consult the regulations and other administrative guidelines.

Valuation Guidelines

The Regulations provide a brief definition of fair market value at Sec. 1.170A-1(c)(2):

> The fair market value is the price at which the property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or sell and both having reasonable knowledge of relevant facts. If the contribution is made in property of a type which the taxpayer sells in the course of his business, the fair market value is the price which the taxpayer would have received if he had sold the contributed property in the usual market in which he customarily sells, at the time and place of the contribution, and, in the case of a contribution of goods in quantity, in the quantity contributed. The usual market of a manufacturer or other producer consists of the wholesalers or other distributors to or through whom he customarily sells, but if he sells only at retail the usual market consists of his retail customers.

This definition is expanded somewhat at Sec. 1.170A-1(c)(3):

> If a donor makes a charitable contribution of property, such as stock in trade, at a time when he could not reasonably have been expected to realize its usual selling price, the value of the gift is not the usual selling price but is the amount for which the quantity of property contributed would have been sold by the donor at the time of the contribution.

The Regulations do not elaborate further on the subject of valuation, and a careful reading of the foregoing quotations reveals a lack of specific guidelines for any property except stock in trade. As a consequence, even though fair market value is subject to definition, the concept is extremely difficult to apply to property that was never sold or exchanged. Thus, what guidelines should the taxpayer use for donated property that is not sold in the ordinary course of business?

Additional Guides. One popular course of action is to obtain an appraisal of the property. However, if the appraiser is connected with the charity, the IRS and the courts might be reluctant to accept his opinion [Schwartz, 1966, pp. 370, 371]. Another method to establish fair market value more objectively is to sell the property and donate the proceeds to charity. In the case of capital gain property, this action would be disadvantageous because IRC Sec. 170(b)(1)(C) permits the taxpayer to deduct the full fair market value of such property (limited to 30 percent of adjusted gross income).[2] Elaborate decision rules have been developed to assist the taxpayer in choosing when to sell and donate the proceeds, and when to donate the property [Smith, 1972]. The Smith [1972] study, however, makes no mention of the valuation problem, which can easily be solved by selling the property and donating the cash received from the sale.

The taxpayer who chooses not to sell but to donate the property when there is no readily ascertainable market value will encounter the most troublesome problems. Closely held corporate stock and objects of art are said to be the most difficult items to value [Garibaldi, 1972, pp. 152, 153]. Englebrecht [1976, pp. 34, 35] presents 27 factors compiled from the Code, Regulations and various revenue rulings in the estate and gift tax areas for valuation of stock. These factors include dividends, earnings, book value, financial ratios, conditions within the industry, market value of stock in comparable industries, and other financial and nonfinancial factors. Also, in regard to other property, Revenue Procedure 66-49[3] [1966-2 CB 125] gives the following guidelines:

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[2] Under Reg. Sec. 1.170A-4(b) (2) and (3), it is necessary for the capital gain property to be used by the qualifying organization in its exempt purpose in order to qualify for the 30 percent ceiling.

[3] Revenue Procedure 66-49 provides that, in general, an appraisal report should contain at least the following (1) A summary of the appraiser's qualifications. (2) A statement of the value and the appraiser's definition of the value he has obtained. (3) The bases upon which the appraisal was made, including any restrictions, understandings, or covenants limiting the use or disposition of the property. (4) The date as of which the property was valued. (5) The signature of the appraiser and the date the appraisal was made. Additionally, the Revenue Procedure prescribes the following information which should be used to support the appraisal of art objects: (1) A complete description of the object, indicating the size, the subject matter, the medium, the name of the artist, approximate date created, the interest transferred, etc. (2) The cost, date, and manner of acquisition. (3) A history of the item including proof of authenticity such as a certificate of authentication if such exits. (4) A photograph of a size and quality fully identifying the subject matter, preferably a 10" × 12" or larger print. (5) A statement of the factors upon which the appraisal was based, such as: (a) Sales of other works by the same artist particularly on or around the valuation date. (b) Quoted prices in dealers' catalogs of the artist's works or of other artists of comparable stature. (c) The economic state of the art market at or around the time of valuation, particularly with respect to the specific property. (d) A record of any exhibitions at which the particular art object had been displayed. (e) A statement as to the standing of the artist in his profession and in the particular school or time period.

1. Market value, not intrinsic worth, governs.
2. Cost or actual selling price may be best evidence.
3. Sales of similar properties are given weight.
4. Reproduction cost may exceed fair market value.
5. Expert opinion must be thorough and supported by facts.
6. Appraiser's competence and knowledge are important.

Nonetheless, there is a distinct absence in the legislative and administrative guidelines of specific formulas, procedures, weights, or under what circumstances to emphasize or de-emphasize factors.

Harnack [1972, pp. 183, 184] provides some suggestions for using expert witnesses in court proceedings. But no studies were found in which the behavior of the Tax Court was subjected to empirical examination, in cases where valuation of charitable contributions of property was decided. Consequently, the purpose of this study is to add needed empirical research to this area of taxation.

DATA

The data incorporated in this study to test for compromise in Tax Court valuation decisions represent a cross-section examination of Tax Court valuations in federal income tax cases involving valuation of property for charitable contribusions.[4] The period investigated was from January 1, 1970, to April 30, 1977.[5] Forty-one Tax Court decisions, both reported and memorandum,[6] were studied. Three significant values were recorded for each case: that claimed by the taxpayer; that allowed by the IRS; and that determined by the Court. Since several cases involve valuation questions about two or more items of property, there were 67 valuation observations included in the regression model. Of these 67 items of property, 25 were real estate, 14 were manuscripts,[7] 6 were works of art, and 22 were miscellaneous items, ranging from furniture, to dogs, to a computer, etc., as indicated in Table 1.

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[4] Our research has been restricted to the Tax Court for four basic reasons. First, it is desirable to have comparability with the results of the Englebrecht study [1977] on compromise valuation by the Tax Court. Second, the Tax Court is considered the court of technical expertise for taxation, because the judges come from tax practice backgrounds (in fact many Tax Court Justices have been appointed from IRS or Treasury Department positions) and only hear tax cases. On the other hand, District Court Judges and Court of Claims Commissioners hear predominantly non-tax litigation. Third, the Tax Court is the primary forum for such cases. Fourth, the question of fair market value is a determination of fact which is not normally subject to review and/or reversal by higher courts.

[5] This sample period was selected because of a desire to incorporate the most current posture of the Tax Court, and to reflect a period of significant activity in valuing property for charitable contribution purposes. Also, it should be noted that all cases, containing sufficient data, between 1-1-70 and 4-30-77 are included in this research study.

[6] The Tax Court issues both regular and memorandum decisions. The memorandum decisions generally deal with situations involving the application of established principles of law. On the other hand, regular decisions involve novel or unique issues not previously resolved by the Tax Court. However, this distinction does become blurred in actual practice, and many memorandum decisions have settled novel issues and obtained great value as precedents. An excellent example is the famous *Cohan* case [39 F.2d 540 (2 Cir. 1930)]. One further distinction between regular and memorandum decisions is that the U.S. Government Printing Office publishes the regular decisions of the Tax Court, and Commerce Clearing House, Inc., and Prentice-Hall, Inc., publish the memorandum decisions in a series of bound volumes. Also, on issues of valuation, the Tax Court hands down far more memorandum opinions than regular opinions.

[7] The manuscripts in this study included six observations which are now of historical significance. That is, the Tax Reform Act of 1969 [P.L 91–172, Sec. 201(a)(1)] prohibited deduction of the fair market value of memoranda created by the taxpayer. The famous Nixon Vice-Presidential Papers controversy will remind the reader that contributions of such property had to be completed before July 26, 1969. Three noteworthy persons, Bill Mauldin [60 T.C. 749 (1973)], Maurice Jarre [64 T.C. 183 (1975)] and Mack David [1976 P-H T.C. Memo 76, 316] had contributed manuscripts of their own creation and claimed a deduction for fair market value under prior law. The Court was apparently impressed by the reputations of these gentlemen and arrived at a value

TABLE 1
DESCRIPTION OF PROPERTY INCLUDED IN "MISCELLANEOUS" CATEGORY IN TABLES 2, 3, AND 4

Description	*Frequency*
Rental Value of Property	3
Equipment	1
Boats	1
Suppositories	1
Dogs	1
Films	2
Computer	1
Stock	2
Reservoir	1
Lease interest	1
Furniture	2
Not clearly categorized	6
TOTAL	22

For each set of observations, a compromise value, half way between the value allowed by the IRS and that claimed by the taxpayer, was computed. The compromise value and the determined value were expressed as a percentage of the value claimed by the taxpayer. Since claimed values ranged from less than $300 to over $750,000, and because the objective was to study compromise, the relative rather than absolute values were of primary importance.

METHODOLOGY

Regression Model

The simple regression model used in this study was:

$$Y = a + bX$$

where

Y = The value determined by the Tax Court, as a percent of the value claimed by the taxpayer
a = The Y intercept
b = The *beta* coefficient
X = The compromise value, as a percent of the value claimed by the taxpayer.

The Null Hypothesis. No significant relationship exists between the Court determined value and the compromise value.

Test of Significance. The F ratio was used to test the significance of the correlation coefficient. With two variables and 67 observations, the minimum F ratio necessary to reject the null hypothesis at the .05 significance level is 3.99.

Chi-Square Test

The *chi*-square test was used to study the statistical independence among the four classifications: real estate, manuscripts, art works and miscellaneous.

The Null Hypothesis. There is no difference among the various classifications used in the study. That is, the Tax Court did not determine values differently for any one classification than for the entire population of the study. In order to use the *chi*-square test, it was necessary to group art works with miscellaneous property. Because there were only six values of art works decided in the study, it was considered essential to combine these groupings, since *chi*-square analysis requires at least five observations in any expected cell [Clark and Schkade, 1974, p. 371].

Test of Significance. At the .05 level of significance the minimum *chi*-square value needed to reject the null hypothesis was 5.991.

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higher than compromise for five of the six manuscripts. The one exception was a Jarre manuscript which had been largely drafted by understudies. Also, it should be noted that at the time the cases were litigated the law had application and on that basis the court made a valuation assessment. Thus, they were subjected to the valuation process being studied and are, therefore, relevant data points. As a consequence, the recent changes did not affect the valuation process.

TABLE 2

FREQUENCY DISTRIBUTION FOR VALUES DETERMINED BY THE TAX COURT AS A PERCENT OF VALUE CLAIMED BY TAXPAYER

	Number of Observations and Percent of Total									
	Real Estate		*Manuscripts*		*Art*		*Miscellaneous**		*Total*	
(TC/T)%	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
>100							1**	4.54	1	1.41
91–100	3	12.00	3	21.43	0	0.00	4	18.17	10	14.93
81–91	3	12.00	1	7.14	0	0.00	1	4.54	5	7.46
71–81	3	12.00	0	0.00	0	0.00	1	4.54	4	5.97
61–70	2	8.00	3	21.43	0	0.00	2	9.10	7	10.45
51–60	2	8.00	1	7.14	0	0.00	5	22.73	8	11.94
41–50	5	20.00	4	28.58	0	0.00	2	9.10	11	16.42
31–40	1	4.00	1	7.14	0	0.00	0	0.00	2	2.99
21–30	1	4.00	1	7.14	0	0.00	1	4.54	3	4.48
11–20	3	12.00	0	0.00	1	16.67	0	0.00	4	5.97
1–10	1	4.00	0	0.00	5	83.33	3	13.64	9	13.42
0	1	4.00	0	0.00	0	0.00	2	9.10	3	4.48
TOTAL	25	100.00	14	100.00	6	100.00	22	100.00	67	100.00

* See Table 1 for descriptions of property included.
** See note on Table 4 describing this unusual decision

TABLE 3

FREQUENCY DISTRIBUTION FOR VALUES DETERMINED BY THE TAX COURT AS A PERCENT OF VALUE ALLOWED BY THE INTERNAL REVENUE SERVICE

	Number of Observations and Percent of Total									
	Real Estate		*Manuscripts*		*Art*		*Miscellaneous**		*Total*	
(TC/IRS)%	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
>1,000	3	12.00	8	57.14	1	16.67	7	31.82	19**	28.36
900–999	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
800–899	1	4.00	0	0.00	0	0.00	0	0.00	1	1.49
700–799	0	0.00	0	0.00	1	16.67	0	0.00	1	1.49
600–699	0	0.00	2	14.29	0	0.00	2	9.09	4	5.97
500–599	0	0.00	1	7.14	0	0.00	0	0.00	1	1.49
400–499	0	0.00	2	14.29	0	0.00	0	0.00	2	2.99
300–399	2	8.00	0	0.00	0	0.00	0	0.00	2	2.99
200–299	3	12.00	1	7.14	0	0.00	2	9.09	6	8.95
100–199	16	64.00	0	0.00	4	66.66	11	50.00	31***	46.27
TOTAL	25	100.00	14	100.00	6	100.00	22	100.00	76	100.00

* See Table 1 for descriptions of property included.
** Includes 15 situations where the IRS allowed no value and the Court determined a value other than zero.
*** Includes 18 instances between the 100–109 interval.

Frequency Distributions

To complete the description of the study, frequency distribution tables were prepared. Distributions showed groupings of decided values, by property classification and in total, as percentages of: the value claimed by taxpayer (Table 2); the value allowed by IRS (Table 3); and the compromise value (Table 4).

TABLE 4
FREQUENCY DISTRIBUTION FOR VALUES DETERMINED BY THE TAX COURT AS A PERCENT OF COMPROMISE VALUE

	Number of Observations and Percent of Total									
	Real Estate		*Manuscripts*		*Art*		*Miscellaneous**		*Total*	
(TC/Comp)%	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
200	0	0.00	0	0.00	0	0.00	1	4.55	1**	1.49
191–200	0	0.00	3	21.43	0	0.00	2	9.09	5	7.46
181–190	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
171–180	0	0.00	0	0.00	0	0.00	2	9.09	2	2.99
161–170	0	0.00	0	0.00	0	0.00	1	4.55	1	1.49
151–160	0	0.00	0	0.00	0	0.00	1	41.55	1	1.49
141–150	0	0.00	1	7.14	0	0.00	0	0.00	1	1.49
131–140	2	8.00	0	0.00	0	0.00	0	0.00	2	2.99
121–130	2	8.00	1	7.14	0	0.00	1	4.55	4	5.97
111–120	1	4.00	1	7.14	0	0.00	1	4.55	3	4.48
101–110	2	8.00	2	14.29	0	0.00	0	0.00	4	5.97
91–100	2	8.00	2	14.29	0	0.00	1	4.55	5	7.46
81–90	4	16.00	2	14.29	0	0.00	0	0.00	6	8.96
71–80	1	4.00	0	0.00	0	0.00	3	13.63	4	5.97
61–70	5	20.00	1	7.14	0	0.00	3	13.63	9	13.42
51–60	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
41–50	1	4.00	1	7.14	0	0.00	1	4.54	3	4.48
31–40	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
21–30	3	12.00	0	0.00	1	16.67	0	0.00	4	5.97
11–20	1	4.00	0	0.00	2	33.33	3	13.68	6	8.96
1–10	0	0.00	0	0.00	3	50.00	0	0.00	3	4.48
0	1	4.00	0	0.00	0	0.00	2	9.09	3	4.48
TOTAL	25	100.00	14	100.00	6	100.00	22	100.00	67	100.00

* See Table 1 for descriptions of property included.

** In *Waterman*, (1975 P-H T.C. Memo 75, 209), the taxpayer had contributed an obsolete computer to a university, which used the computer for instructional purposes. Based upon the selling prices for computers with similar capabilities, a value of $25,000 was claimed. The IRS disallowed all but his cost of $2,078, claiming that the only indication of market value for the obsolete machine was the price which the taxpayer had paid. An expert witness, however, testified that the components, if sold individually, would be worth $35,000. The Tax Court agreed with the witness and allowed a deduction for $35,000.

RESULTS OF THE STUDY

Regression Model

The regression was performed using the Statistical Package for the Social Sciences. The F-Test value of 7.6733 exceeded the minimum necessary value of 3.99 to reject the null hypothesis at the .05 significance level. Evaluation of the R^2 statistic, however, reveals that less than ten percent of the variation in decided values can be explained by the compromise value.[8] In comparison to the Englebrecht study [1977, p. 103], where over 97 percent of the variation in court-determined values could be explained by variations in the compromise value, this study has produced an insignificant R^2. Thus, a change of one percent in the compromise value would result in only a change of approximately 0.1 percent in the decided value.

Chi-Square Analysis

The computational determinants of the

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[8] R^2 was .09186 after being adjusted for the number of observations.

TABLE 5

PROPERTY DEMARCATION OF VALUATION DECISIONS ABOVE AND BELOW THE COMPROMISE VALUE

Values \ *Property Classification*	*Real Estate*	*Manuscripts*	*Other*	*Total*
Above Compromise	7	8	9	24
Below Compromise	18	6	19	43
Total	25	14	28	67

TABLE 5A

EXPECTED DISTRIBUTION OF VALUATION DECISIONS ABOVE AND BELOW THE COMPROMISE VALUE

Values \ *Property Classification*	*Real Estate*	*Manuscripts*	*Other*	*Total*
Above Compromise	8.95	5.01	10.03	23.99
Below Compromise	16.05	8.99	17.97	43.01
Total	25.00	14.00	28.00	67.00

chi-square test are found in Tables 5 and 5A. These tables show the observed and expected frequencies, respectively, of decided values, for each property classification, above and below the compromise value. The *chi*-square statistic was computed as 3.602, compared to the minimum value of 5.991 needed to reject the null hypothesis. Acceptance of the null hypothesis implies that the Court decided the values of contributed real estate and manuscripts in a manner similar to the values of other contributed property.

Frequency Distributions

As shown in Tables 2, 3, and 4, frequency distributions were prepared demonstrating the values determined by the Tax Court as percentages of: the values claimed by the taxpayer, the values allowed by the IRS, and the compromise values. Each distribution indicates that the Court's values were widely dispersed over the whole range of percentiles. The Court does not appear to be biased towards either the taxpayer or the IRS, nor does it habitually find a compromise between the two positions.

ASSESSMENT/CONCLUSIONS

This study produced empirical evidence which does not support the theory that the Tax Court acts as an arbitrator or compromiser when valuing property for the charitable contribution deduction. Also, *chi*-square analysis indicated that neither real estate nor manuscripts are routinely given values higher or lower than other types of property.

According to the frequency distributions, the Tax Court was less generous to the taxpayer in valuing donated works of art then in valuing other types of property, but, with only six observations, it was impossible to perform a rigorous statistical analysis. It should be noted, however, that none of the taxpayers claiming a deduction for art objects had documented his case in accordance with the guidelines set forth in Revenue Procedure 66-49 [1966-2 CB 1259]. The IRS, in several instances, used expert witnesses to document its valuation, and the Court, in five instances, arrived at a value of ten percent, or less, of the value claimed by the taxpayer.

In arguing a case before the Tax Court, it must be remembered that the burden of proof is on the taxpayer. The successful taxpayers in this study sustained their burden of proof through the use of expert witnesses, appraisals, and other well-documented evidence to support their values. In only 11 instances, however, were taxpayers allowed more than 90 percent of the value they claimed (Table 2). In 18 instances, the Court determined a value which exceeded the IRS value by less than ten percent (Table 3). In the remainder of the observations, the Court found some merit in each position. Rather than merely compromising by "splitting the difference," the Court appeared to weigh the evidence carefully and attempted to find a fair and equitable value based on the facts of each case.

Reflections

The findings of this study clearly indicate that compromise is not prevalent in the Tax Court's valuation of property for charitable contribution purposes. As a result, neither taxpayers nor the IRS can expect the Tax Court to compromise routinely between the two conflicting valuations. Therefore, the direct inference for taxpayers is to have property valued at realistic fair market prices.

Areas requiring additional research are: (1) investigation of the compromise charge in other judicial forums for charitable deduction purposes, and (2) studies examining the influence of human factors on valuation—both with respect to the litigants and the judges.

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Performance Effects of Different Audit Staff Assignment Strategies

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ABSTRACT: This study examines the effect on audit staff performance of different assignment strategies. There is a review of the theoretical models and related empirical evidence for performance in a sequence of assignments, and data from 573 staff evaluation forms for two offices of large public accounting firms are analyzed. The review and analysis show some evidence that there is a lapse in performance over time for audit staff at the senior level if the seniors are assigned consecutively within a particular industry, while no lapse in performance is observed for those seniors who are rotated among assignments in different industries. These findings are generally consistent with the research findings in interference theory—a theory which attempts to explain certain kinds of verbal learning behavior.

In order to provide the highest quality of audit service at a reasonable fee, most audit firms would like to identify and manage those factors which can expedite the learning process for audit staff through the selective assignment of jobs and training sessions. However, the firms now face some difficulty in choosing an effective assignment policy due to the lack of a relevant theory and related empirical evidence to guide them. It is not clear, for example, that a policy which requires audit staff to repeat a certain assignment will produce better performance than a policy which exposes the staff to as wide a variety of different assignments as possible. In fact, an informal survey of partners of the two public accounting firms participating in this study revealed that there appears to be some divergence as to the policies of the firms for staff assignment.

The objective of this paper, then, is to provide some evidence about the relationship between assignment policy and the performance of audit seniors. Three experimental hypotheses are examined: (a) the performance of the audit senior does not change throughout a sequence of assignments with the same client, (2) the performance of the audit senior does not change throughout a sequence of assignments each of which is within the same industry category, and (3) the performance of the audit senior does not change throughout a sequence of assignments such that each assignment in sequence is in a different industry category.

The following section outlines the potential benefits of effective assignment policies. This is followed by a review of

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learning theories and related empirical findings to provide a basis for *a priori* expectations about the study of the hypotheses in an audit context.

BENEFITS FROM AN EFFECTIVE ASSIGNMENT POLICY

Two major benefits to be obtained from the effective assignment of staff in any organization such as the audit firm are (1) improvement in the quality of the firm's service as staff capabilities are matched to job needs and (2) improvement in the professional development of each staff person through scheduling assignments so as to maximize the potential for staff learning and reinforcement of acquired skills. Moreover, for at least two important reasons, these benefits may be particularly substantial for audit firms. First, the audit service is labor intensive so that marginal improvements in the productivity of labor through improvements in scheduling assignments should have a high payoff in improved overall performance. Second, since auditors at all levels are faced continually with innovations in audit procedures, such as new sampling procedures and new audit guidelines in certain industries, an assignment strategy which is responsive to the learning needs of the auditor should provide a substantial benefit for the firm.

LEARNING THEORIES AND EMPIRICAL EVIDENCE

Research in learning can be classified along at least the two following dimensions—(a) the type of task which is learned, either a motor task or a conceptual task; and (b) the nature of the task sequence, either a sequence of identical tasks or a sequence of similar but not-identical tasks. To illustrate these distinctions in an audit context, a motor task could be the ability to operate an adding machine, while a conceptual task could be the ability to perform an internal control review. Further, a sequence of identical conceptual tasks could be one for which an auditor conducts the internal control review for a certain audit client each year as part of the annual audit. Alternatively, an example of a sequence of similar but not-identical tasks could be the completion of an internal control review for a sequence of different audit clients, all of which are in the same industry.

This distinction between motor and conceptual tasks is important because there is a different expected pattern of performance for tasks in each category. Compare the hypothetical learning model for motor tasks in Figure 1 with the model for conceptual tasks in Figure 2. The figures depict performance as a function of cumulative activity over time. Performance improves continuously in Figure 1, while there is a "pause" in performance improvement in Figure 2.

FIGURE 1

HYPOTHETICAL LEARNING MODEL FOR MOTOR TASKS

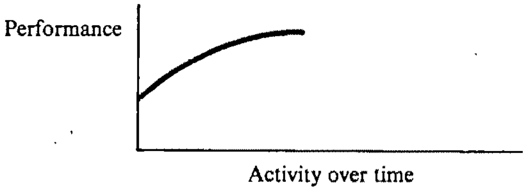
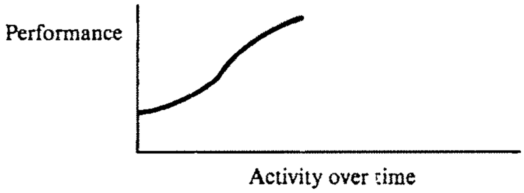


FIGURE 2

HYPOTHETICAL LEARNING MODEL FOR CONCEPTUAL TASKS



Likewise, one can expect differences in learning due to differences in task sequence. The following two sections review the theory and empirical evidence for learning a sequence of tasks—both for a sequence of identical tasks and for a sequence of similar tasks. However, since most audit tasks are conceptual tasks, there will be no further study of motor tasks. Nevertheless, it is worthwhile to keep in mind the motor/conceptual distinction since most of the empirical work and application in business and accounting have been in the context of motor tasks.[1] Thus, it is possible for the naive audit manager erroneously to expect learning patterns in a broad range of audit contexts which are similar to those found in the well-known studies for motor tasks.

THE SEQUENCE OF IDENTICAL CONCEPTUAL TASKS

While business and accounting researchers have given some attention to the study of factors which influence human performance of conceptual tasks, relatively few have looked at the pattern of learning over a sequence of tasks. As representative of the studies which have considered a sequence of identical tasks, findings reported by Hilgard [1962], Travers [1972], Gagné [1977], and Kintsch [1970] suggest that learning patterns for conceptual tasks generally show at first a period of declining or stable performance followed by continuously improving performance. The result is a performance curve, called the "S" curve (Figure 2), which resembles the conventional learning curve (Figure 1) except for a "dip" or "pause" in performance for the first period of trials for the task. In one of the few accounting or business studies in this area, Mock, Estrin, and Vasarhelyi [1972, pp. 141–146] observed the dip in performance for 47 students and 25 businessmen in the first few trials of a business simulation experiment.[2]

Now, consider the audit context. There is a need to study the effect on auditors' performance of a sequence of identical tasks. A good example of a sequence of such tasks in an audit context is the case when the audit senior is assigned to a particular audit client for two or more audit jobs in succession, which is a common practice. Then, one can study the question about the effect of task sequence through a test of the following hypothesis:

> *H1:* The performance of the audit senior does not change throughout a sequence of assignments with the same client. (Alternate hypothesis: performance will decline at first and then improve steadily.)

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[1] These studies generally have shown that this type of performance follows a predictable learning pattern that can be estimated by a monotonically increasing learning curve such as illustrated in Figure 1. For example, Baloff and Kennelly [1967] and Baloff [1971] show that a plot of the performance over time of certain production-level employees in auto assembly, apparel manufacturing, and large musical instrument construction is a good fit for the log-power function form of the learning curve. This type of analysis has been applied widely in business and accounting, for example, in estimating project costs [Taylor, 1961], in personnel management [Lundgren and Schneider, 1971], in production management [Keachie and Fontana, 1966], and other related problem areas.

[2] This pause or dip in performance can be explained in at least three ways. First, in learning a conceptual task, the subject experiences an initial combination of confusion and anxiety which results in a trial and error approach to learning [Hilgard, 1962, p. 57]. Second, the subject improves in learning a conceptual task in two stages: at the first stage the subject obtains a familiarity with the fundamental concepts for the task and there is little if any improvement in performance. Then, at a later stage there is a higher level understanding of the task such that learning improves at a more rapid rate [Gagné, 1977, p. 33–34]. A related notion is that of a "learning set" which has been used to explain an increase in the rate of improvement of performance in the second stage. The accumulated experience with a task in the first stage creates a problem-solving insight into the task which enables the subject to avoid pitfalls and to perform more efficiently [Harlow, 1949]. Third, the pause in improvement might be due to a temporary reduction in effort following an initial attempt to perform well in order to make a good first impression.

The reasons for the choice of this particular audit context are discussed later.

SEQUENCES OF SIMILAR TASKS

The pattern for performance over time for those repeating similar but not-identical conceptual tasks has been studied extensively in what is called "associative transfer in verbal learning." Verbal learning is the learning of knowledge which can be expressed orally or in writing, in contrast, for example, to the learning of motor skills. Thus, for this study the term "conceptual skills" is used to refer to verbal items such as written instructions, policy statements, and the like. In the audit context, this would mean audit programs and other related oral or written materials related to audit procedures. The term "transfer" is used to identify the phenomenon that the learning of one task might facilitate or interfere with the subsequent learning of another task. When the learning of one task facilitates the learning of another task, the term "positive transfer" is used. When there is interference, it is often called "negative transfer," interference," or "inhibition." A substantial body of theoretical and empirical work has focused on the latter area, and has become generally known as "interference theory." Interference implies that task performance declines for a period of time when the auditor (negatively) transfers training from a prior task to the subsequent, similar task.

Some experimental work has shown that interference can be expected in certain sequences of similar tasks. For example, Postman [1962] was able to show interference for subjects whose task was to identify correctly the antonyms or synonyms for lists of paired-associate adjectives.[3] All subjects completed two experimental tasks. In the first task, the subjects learned to associate two adjective lists. Call this first task the "A-B" task, where A is the first and B is the second of the adjective lists. The task of the subject is to learn to associate the words so that when "A" appears, he or she will be able to identify the correct associate "B." In the second task, one group of subjects learned a second set of lists for which only the second list was different (that is, the subject learned A–B and then learned A–C), while another group of subjects learned a second set of lists, both of which were different from the prior set (an A–B, C–D sequence). The reappearance of the list A for the first group was expected to create interference with the performance for the second task, since the subject had to learn a new associate "C" for the common element "A." In fact, Postman found that performance for the "interference" group (the A–B, A–C sequence) declined significantly from the first to second task, while the group without interference (the A–B, C–D sequence) performed equally well on both tasks.

These findings have been both supported and challenged by more recent work, and at present the evidence is inconclusive, as indicated by Kintsch [1970, pp. 29–30] and others. The early findings are generally viewed now as providing a basis for directing the research needed for building a more explanatory theory.[4] Because of the multiple factors and related interactions known to have some impact on the transfer of learning it is not possible to draw unambiguous guidelines from the available empirical work. However, it is important to note that the phenomenon of interference has been observed in a large number of such studies, and the current controversy has focused on the search for an explanation for the phenomenon rather than to disprove its existence.

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[3] This experimental paradigm (adjective check list) is used extensively in verbal learning experiments, as evidenced from the fact that several books have appeared in recent years devoted primarily to the results achieved with this technique.

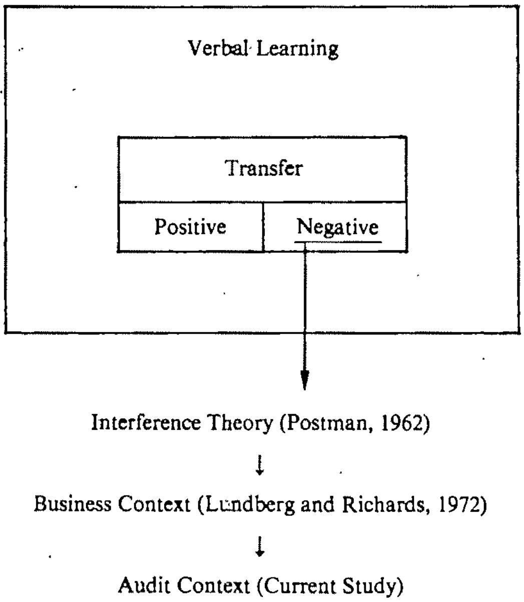
[4] For example, much of the current work is directed to testing the main effects and interaction effects of a large number of variables which are known to affect the transfer of training—amount of first task practice [Postman, 1962], stimulus and response meaningfulness [Martin, 1968], task similarity [Underwood, 1951], response availability [Postman and Stark, 1969], stimulus encoding [Martin, 1972], and memory retrieval processes [Postman, 1975], among others.

Interference Findings in a Business Context

The Postman findings can be generalized to a business context (see Figure 3) through the work of Lundberg and Richards [1972] who found higher levels of performance in a particular business game for subjects who had no prior experience with business games than for subjects who had some prior experience with a different, but similar business game. Lundberg and Richards (LR) interpreted these results in the following way. The subjects who had played a previous, similar game might have associated the two business games and routinely applied decision rules they had developed playing the previous game rather than developing more appropriate, new decision rules for the later game. They called this failure to adapt the "program effect." Later, Petru [1974] was able to replicate the LR study and found evidence of the "program effect" in a similar business game context. Though LR and Petru made no reference to the transfer studies, it seems they have found an example that prior experience in a given conceptual task can cause lower performance in a subsequent task which is similar but not identical.[5]

FIGURE 3

CONCEPTUAL OVERVIEW OF THE STUDY OF SIMILAR BUT NOT-IDENTICAL TASK SEQUENCES*


Verbal Learning
Transfer
Positive
Negative
Interference Theory (Postman, 1962)
Business Context (Lundberg and Richards, 1972)
Audit Context (Current Study)

* The purpose of this diagram is to assist the reader in identifying the focus of this study. It is not intended to provide a comprehensive and balanced classification of all the fields of study which are related to learning theory.

Interference in an Audit Context

The findings of Postman's interference study and LR's study of interference in a business context can be generalized to the audit context (see Figure 3) in the following way. Consider, for example, the sequence of assignments typically performed by the audit senior. At times, each assignment in a sequence is of the same type, calling for the application of familiar decision rules. For example, suppose a given auditor is aware of a continuing internal control problem for a particular client, so that when he or she returns to supervise the audit field work from year to year, he or she is able to adapt the audit program for each engagement in succession. Alternatively, as in the LR study, the sequence of assignments might be for tasks which, though they might appear to the auditor to be similar in nature, require the application of quite different decision rules. For example, the auditor assigned to a sequence of assignments in the same industry might be conditioned to expect a certain configuration of internal control problems because of generally similar accounting practices within the industry. In this context, the audit senior's expectation of similar accounting practices might result in a form of "interference" as identified in Postman and LR, which could lower the senior's performance when a particular client within this sequence has unique internal control problems. On the other hand, a senior who is rotated among clients in different industry groups might be less likely to have expectations which can lead to interference. These propositions lead to the consideration of the following two hypotheses:

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[5] One might question whether it is meaningful to compare learning in the context of a business game to that of the adjective lists as used in verbal learning experiments. Travers [1972, pp. 165–166] points out that a principal reason for the popularity of the adjective list paradigm in verbal learning is that a significant amount of verbal learning is essentially learning associations. This is descriptive of business tasks as well. For example, in a business game the student learns to associate certain facts with certain action choices. Thus, the task for subjects with no prior experience with business games could be likened to the A–B, C–D sequence for the control group in the interference studies, while the subjects who did have prior experience performed more of an A–B, A–C type of sequence, which is the interference context.

> *H2:* The performance of the audit senior does not change throughout a sequence of assignments each of which is within the same industry group. (Alternate hypothesis: performance will decline at first and then improve steadily.)

> *H3:* The performance of the audit senior does not change throughout a sequence of assignments such that each assignment in sequence is in a different industry group. (Alternate hypothesis: performance will decline at first and then improve steadily.)

In effect, these hypotheses propose that an interference effect is caused by the common factor of industry classification of clients. It is reasonable to suppose that other factors in the audit environment might produce the same effect, such as the size of the client or the time required to complete the audit assignment. However, the industry assignment policy was chosen as the interference factor for this study since this information is readily available, and also because public accounting firms have continued to consider this an important factor in staff assignment policies.

RESEARCH METHOD

The data used to test the three experimental hypotheses is the performance of the audit senior as measured by staff evaluation forms completed by audit managers. The audit senior was chosen rather than audit staff at lower levels for three important reasons. First, auditors at the senior level are somewhat more homogeneous in terms of professional development relative to staff at lower levels. Second, auditors at the senior level usually will not be promoted as quickly as those at lower levels. For this reason, it is more feasible to obtain the data for the extended period of time which is necessary for this study. Finally, one can expect relatively good reliability of the audit manager's review of the senior since the rating from is uniform in format and familiar to the reviewing managers.[6]

After some preliminary discussions with a few national public accounting firms, two firms agreed to participate in the study. The two participating firms provided certain data from the staff evaluation forms of audit seniors for 12 consecutive assignments beginning with the first assignment following the individual's promotion to senior. This data includes 40 seniors from an office of firm A with 378 related evaluation scores (480 possible) and 18 seniors from an office of firm B with 195 evaluation scores (216 possible). These audit assignments took place in the period 1971–1975, depending on the individual senior. The majority of these seniors were promoted in 1972, and the remainder were promoted to senior in 1971, 1973, or 1974.[7] Neither of the firms made any change in the staff evaluation form or in review policy during this period. The performance measure obtained from these forms was the reviewers' overall evaluation of the seniors' work for each assignment, which was given on an ordinal scale from "superior" to "needs improvement."[8] If any of the forms lacked complete data in any way (for example, if the reviewer indicated that he or she could not provide a rating on that assignment), then the assignment was omitted from the data base for this study. As a result, there are 573 usable evaluation scores for both firms. If this omission interrupted a sequence of assignments used in the tests, then the entire sequence was excluded from the tests of the experimental hypotheses.

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[6] There is a potential for bias of the review score in that the reviewing manager might have a purpose in the review which is unrelated to the performance of the senior on a given assignment. Unfortunately, because of the *ex post* nature of the data collection procedure in this study, it is not feasible to control for these sources of bias, and there is, therefore, greater exposure of type two error, the chance that the experiment will fail to reject the null hypothesis when it should be rejected. Chen and Lambert [1977] comment on some of the methods and the difficulties in identifying this type of bias.

The statistical test chosen for examining the changes in performance over a sequence of assignments is the sign test [Siegel, 1956]. This test is typically used in looking for differences between observations on matched pairs (in this case the assignment evaluation scores) when the sample size is limited or when it is possible to rank the observations, but where interval or ratio scale measurement is not appropriate. Thus, the sign test is chosen for this study because of the ordinal nature of the data and because of the limited sample size in most of the test comparisons. A one-tail test is used for testing the first-to-second assignment sequence, and a two-tail test is used for the second-to-third assignment sequence since there is a possibility of improvement on the third assignment.

FINDINGS FOR HYPOTHESIS ONE

The findings from the data show no evidence of a change in auditor performance in consecutive assignments with the same client. No significant differences were found between the number of auditors who improved and those whose performance declined from the first to the second assignment for a given client, as shown in Table 1. Similar results are found for performance changes for these auditors from the second to third assignment with the same client. That is, the performance of these audit seniors as measured by staff evaluation forms does not appear to change significantly over a sequence of assignments with the same audit client.

These findings can be interpreted in at least three ways. First, the findings might

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[7] Firm B did not respond as fully to the request for data as did firm A, and as a result some of the intended test comparisons were not possible for the firm B data, as noted in Tables 1.

[8] Firm A used a three-point scale and firm B used a five-point scale in this evaluation. Additionally, the firm B form requires a single composite evaluation in which the manager summarizes his overall assessment of the senior in this assignment, while the firm A rating form requires the manager to rate the senior on a number of different criteria, such as completeness of his working papers and the accuracy of his work. For firm A, a composite performance score was computed from the simple average of a selected subset of seven of these criteria ratings. Some guidance in this selection was obtained from the firms participating in this study. In addition, each of the subsequent tests was performed using each of these criteria singly as well as the composite score. No important differences were noted between the patterns of performance observed for each of the criteria and the pattern for the composite score.

TABLE 1
CONSECUTIVE ASSIGNMENTS WITH THE SAME AUDIT CLIENT

*The number of audit seniors whose performance improved or declined on consecutive assignments**

		Change from first to second assignment			*Change from second to third assignment*		
Firm A	*N*	*n*	*Decline*	*Improvement*	*n*	*Decline*	*Improvement*
All seniors	40	21	6	11	21	6	10

Note: The number *n* is the total number of assignment sequences available for the test. The total number of performance changes is less than *n* because of ties. The number *N* is the number of audit staff.

* These differences are not significant at a $\alpha \leq 0.5$. A *t*-test comparison of mean performance for the three assignments produced the same results. The mean scores—first assignment (12.3), second (12.3), and third (11.5)—are not significantly different at $\alpha = .05$ (a higher score signifies lower performance). There were not enough repeated assignments with the same client in the firm B data for a statistical test.

result from the reviewing manager's expectation of higher performance for the senior in repeating these assignments. Thus, the scores show no significant change in reported performance though some improvement has taken place. Second, the evaluation scores may not change if the same manager and senior were scheduled together for each assignment with a given client, as is common in practice. (It is also evident for many of the sequences in these data.) In this case, the manager might form an opinion of the senior on the first experience and repeat that evaluation for each later assignment. Third, there is simply no significant performance change over the sequence of assignments. In summary, these findings seem to suggest that either the performance of the audit senior does not change significantly for consecutive assignments with the same client or that this change is not reported by the reviewing manager. Although these findings should not be generalized beyond the context of the present study, there is some indication that a firm should use caution in accepting an assignment policy based upon the assumption that audit staff performance improves with repeated assignments with the same client.

FINDINGS FOR HYPOTHESIS TWO

The results of the analysis for the second hypothesis produced significant findings. As outlined in Table 2, the performance of audit seniors in consecutive assignments within the same industry shows a pattern of decline in performance at first, followed by subsequent improvement. This finding suggests that audit managers of these two public ac-

TABLE 2
CONSECUTIVE ASSIGNMENTS IN THE SAME INDUSTRY

*The number of audit seniors whose performance improved or declined in consecutive assignments**

		Change from first to second assignment			*Change from second to third assignment*		
Audit Senior Subgroup	*N*	*n*	*Decline*	*Improvement*	*n*	*Decline*	*Improvement*
Firm A							
All seniors	40	32	17 **	6	32	10	13
Firm B							
All seniors	18	10	4	3	10	2	6

Note: The number *n* is the total number of assignment sequences. The total number of performance changes is less than *n* because of ties. The number *N* is the number of participating audit staff.

* If the data for a given senior included more than one three-assignment sequence for a given industry, only the first of these was included in the analysis, since one would expect the learning in the earlier sequence to add a confounding factor to the analysis.

** This difference is significant at $\alpha \leq 0.5$. At *t*-test comparison of mean performance for the three assignments produced the same results. The mean scores—first assignment (A-11.8, B-3.7), second (A-12.6, B-3.9), and third (A-12.2, B-3.5)—are not significantly different at $\alpha = 0.5$, except for the change in performance from first to second assignments for firm A seniors (a higher score signifies lower performance for both firm A and B).

TABLE 3

CLASSIFICATION OF ASSIGNMENT SEQUENCES IN TABLE 2 BY INDUSTRY CATEGORY

Industry Category	*The number of assignment sequences (n) in each industry* — *Firm A*	*Firm B*
Banking and Financial	9	1
Merchandising	6	0
Manufacturing	12	8
Utility	3	1
Other	2	0

TABLE 4

CONSECUTIVE ASSIGNMENTS EACH IN A DIFFERENT INDUSTRY

*The number of audit seniors whose performance improved or declined in consecutive assignments**

		Change from first to second assignment			*Change from second to third assignment*		
Audit Senior Subgroup	*N*	*n*	*Decline*	*Improvement*	*n*	*Decline*	*Improvement*
Firm A All seniors	40	9	3	3	9	3	4
Firm B All seniors	18	18	7	4	18	2	9

Note: The number *n* is the total number of assignment sequences. The total number of performance changes is less than *n* because of ties. The number *N* is the number of participating audit staff.

* These differences are not significant at $\alpha \leq .05$. A *t*-test comparison of mean performance for the three assignments produced the same results. The mean scores —first assignment (A-12.3, B-3.6), second (A-12.5, B-3.5), and third (A-12.0, B-4.1)—are not significantly different for $\alpha = .05$ (a higher score signifies lower performance for both firm A and Firm B).

counting offices should be concerned about the effect on staff performance of a sequence of assignments in the same industry. Of course, additional research of this type is needed in order to clarify the effects on audit performance of alternate policies for personnel assignment.

The industry of the client in each assignment sequence was provided by the firms, and is shown in Table 3. The firms were asked to classify the industry of the client in one of the following six categories—banking and financial, transportation, merchandising, manufacturing, utility, and other. Industries with eight or more assignment sequences were analyzed, and no significant performance changes were found. Thus, it appears that the performance changes observed in Table 2 cannot be explained only by the industry of the assignment.

FINDINGS FOR HYPOTHESIS THREE

Hypothesis three is the situation for which the auditor has a sequence of assignments each of which is in a different industry—for example: Industry A, Industry C. One would expect from the cited studies that little or no interference would take place since the nature of the tasks in the sequence is now somewhat different; whereas for hypothesis two, the tasks are somewhat similar. The data were analyzed in the same manner as above to test for this hypothesis and, as shown in Table 4, it was found that there was no significant improvement or decline in performance for seniors of either firm. Thus, in comparing the findings for hypothesis two and hypothesis three, it seems that interference may appear more readily for a sequence of assignments in the same industry than for a sequence of assignments each of which is in a different industry.

LIMITATIONS

These findings should be interpreted carefully because of the limited data and the limited validity and reliability of the staff evaluation form for measuring staff performance. Additionally, because of the limited scope of the study it has not been possible to control for many factors which can influence staff performance and staff evaluation, and thus could have a confounding affect on the test results. For example, factors such as the nature and timing of feedback, the auditor's prior experience, and the influence of extrinsic and intrinsic reward systems could affect staff motivation and performance. Also, the experimental tests do not control for the potential effect of assignment-related factors such as the length of the assignment, the difficulty of the assignment, and the size of the client.

SUMMARY

Based upon a review of the research findings in learning theory and an analysis of the evaluations of audit seniors on the staff evaluation forms used by two public accounting firms, this study has pointed out some areas of concern for the purpose of developing a strategy for scheduling audit assignments. Specifically, the findings of the data analysis and the results of prior learning studies suggest that the audit manager should be aware of the potential for decline in performance by audit seniors in the early phase of a sequence of assignments in the same industry. In contrast, no significant decline or increase in performance is found over a sequence of assignments either (a) for the same audit client, or (b) for clients in different industries. It is to be hoped that the findings of this study will point the way for more informed policy and research directions for the assignment of audit personnel.

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REVIEW ARTICLE

State of the Art—Non-Business Accounting

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SINCE the beginning of 1978, several publications have evidenced a renewed interest in those areas of accounting which are somewhat outside the purview of business-oriented thought—governments, quasi-public institutions (such as hospitals, societies, and clubs), religious organizations, universities and colleges, foundations and the like. The first to appear was a proposed revision of a chapter from *Governmental Accounting, Auditing and Financial Reporting*, published in 1968 by the Municipal Finance Officers Association. This chapter on Principles was circulated by the National Council on Governmental Accounting for comments to be returned by June 15. This is an improvement on the pattern of principles that has been developing since 1934, but no drastic changes in the well-established pattern are observable.

Some time before this, the Financial Accounting Standards Board (FASB) had commissioned a research study by Robert N. Anthony, entitled *Financial Accounting in Nonbusiness Organizations: An Exploratory Study of Conceptual Issues*. This was completed and published by the FASB in May, 1978, as a Research Report, in continuation of the Board's interest in conceptual developments in accounting. Following its usual practice, the Board arranged hearings to discuss written comments on the report on October 12 and 19, and a last one on November 3. The written comments were to be submitted by September 11. To facilitate this, a ten-page "Discussion Memorandum" was circulated on June 15: this was a statement of the issues raised in the Report with additional questions added.

At this writing (December, 1978) nothing further has been released by FASB except an 11-page "Overview" written by Anthony, entitled "Financial Accounting Concepts in Nonbusiness Organizations." This paper calls attention to the need for a unifying theme from which concepts related to *both* business and non-business accounting might be developed. The author suggests that "capital maintenance" could serve as a starting point to build the conceptual framework. The argument for this is that both groups must balance inflows and outflows so as to avoid the erosion of capital if they are to survive. In the business firm, this produces an emphasis on earnings to cover costs, including the

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cost of capital. Capital maintenance concerns the non-business organization in the pattern of operating "within the budget"—a "break-even" case of capital maintenance. On the assumption that this unifying idea could be accepted, Anthony proceeds to show that only a few major questions would need to be resolved:

(1) A principle must be developed that will distinguish operating inflows from capital inflows.
(2) Principles are needed to establish when the non-business inflows are to be recognized; realization from sales of goods or services may not be adaptable to non-business inflows.
(3) While a business charges depreciation to match expirations of capital costs with revenue, non-business organizations acquire capital assets by grants or legislation, and principles must span this gap.
(4) There are other problems, such as volunteer services, gains and losses, and the measurement of income from endowments, but these are not difficult.

This result would be desirable, but the major difficulty lies in motivation; the business firm is motivated by the hope of augmenting its capital to produce growth from profits; the typical non-business organization has no such motivation, because its capital (indeed, practically all of its inflows except service charges) is supplied by asking for it, or having a legislature appropriate it. The basic point of California's Proposition 13 is that there is no way to provide motivation for governmental cost reduction and efficiency except to limit the supply of resources. Perhaps there is a way to control motivations in non-business organizations.

The only other item which this reviewer has found in current publications is a six-page condensed (typographically as well as rhetorically) "Analysis of the FASB Anthony Report," published by the Municipal Finance Officers Association. It is a digest of the report with an appendix that adds the questions posed in the discussion memorandum to a repetition of Anthony's 16 issues, but it offers no evaluation or comment.

Thus, the developments of the year with respect to non-business accounting are limited to the content of the Research Report, which is reviewed at length in the following pages.

THE ANTHONY REPORT

The report opens with a brief review of the current situation regarding the field of "non-business" accounting. There are a number of statements of accounting procedures applicable to such organizations as general or municipal governments, colleges and universities, independent schools, hospitals and other health and welfare agencies, churches, clubs, and museums. In addition, there are five AICPA Audit Guides, as well as a pending "Statement of Position," which when approved will apply to most nonprofit institutions not now covered. Several states have laws which spell out the principles to be followed by their governmental units, but these are not consistent with publications of the National Council on Governmental Accounting, nor with the AICPA Audit Guides. In about half of the 50 states, the state accounting systems are on a cash basis, or some other basis not consistent with NCGA positions. A research study covering the reports of 46 cities indicated that more than half of them did not comply with NCGA principles. Some reports in the municipal area are seriously deficient. Jan Lodal is cited (p. 4):

> New York is perhaps the outstanding example of such a situation, having "balanced" its books according to its own self-imposed financial policies and system while accumulating a true deficit of $4 billion.

Anthony adds, "some users find existing financial reports deficient in that they provide fragmented information, are unnecessarily inconsistent in format and terminology with financial reports of business enterprises, and therefore are difficult to understand" (p. 4).

These and other considerations are seen as pointing to a need for action of the sort which has been the work of the FASB, and especially the need for a conceptual framework—"a set of broad, internally consistent fundamentals, and definitions of key terms." The purpose of the Anthony report is "to identify the problems that would be involved in arriving at one or more statements of objectives and basic concepts of financial reporting of non-business organizations."

The report does not attempt to define a "non-business organization," but the term "should be understood to include, roughly, governmental and other non-profit organizations" (p. 7). A more precise definition is deferred to Chapter 5.

The definition does not really emerge there, either, being lost in a complex of arguments concerning the criteria to be applied in establishing distinctions between business and non-business organizations.

There is, however (p. 8), a list of 25 non-profit organizations from an exposure draft dated April 1, 1978 of the AICPA Accounting Standards Subcommittee on Nonprofit Organizations. This list is fairly exhaustive, and it is "useful background for thinking about the problem." Anthony sets up two categories of non-profit organizations: Type A which includes "non-profit organizations [which] obtain their financial resources entirely, or almost entirely, from revenues realized from selling goods or rendering services" (p. 9), and Type B which obtain "a significant amount of financial resources from sources other than the sale of goods and services" (p. 10).

By way of further clarification of the scope of the study, the author gives his reasons for excluding the subjects of internal accounting, budgetary information, special purpose reports, and standards, as such. Human resource and social accounting as well as the measurement concept (departures from historical cost) are excluded, except that "depreciation on replacement cost, and the computation of endowment earnings in periods of changing price levels are exceptions to the basic approach." Issues having to do with multi-level and consolidated reports, affiliated and ancillary organizations, or overlapping of interests are excluded as matters of standards rather than concepts. There are six pages of premises of the study, mostly concerned with the accounting model, references to earlier studies, and assumptions about users of financial information.

The plan of the report is given:

Chapter 2.	Problems of identifying users and their information needs.
Chapter 3.	Alternative concepts of reporting; Operating versus Financial Flow Statements.
Chapter 4.	Alternative concepts regarding certain items reported in Financial Statements.
Chapter 5.	Three basic issues regarding the appropriate boundaries for a set of accounting concepts for non-business organizations.

A section is devoted to special terminology, but since these definitions are restated more concisely (in a longer list which does not include "spending"), we defer discussion of them here. However, we note that

> *Spending* has to do with the resources used in an accounting period. It is an intentionally vague term, broad enough to encompass the alternative specific concepts of encumbrance, expense, expenditure, or cash disbursement. Its only purpose is to permit statements to be made that do not imply a preference for one of these specific concepts. It is *not* recommended for use in a concepts statement; a concepts statement should use one or more of the specific terms, depending on the approach that is finally decided upon (p. 30).

Chapter 2 is concerned with two of the 16 basic issues. One is identifying the principal classes of users of non-business reports; the other is identifying the information needs of these users that can be met by general purpose financial reports. The list of users includes: (1) Governing Bodies, (2) Investors and creditors, (3) Resource-providers, (4) Oversight Bodies (*i.e.*, regulatory agencies or committees of legislatures), and (5) Constituents (taxpayers, the general public, participants in a health maintenance organization, or members of a club or fraternal organization). The author recognizes the lack of sharp distinctions among these groups. They overlap; they are not exhaustive; not all of them are found in every organization; their importance varies as between different entities and at different times; they are not equally competent; nor do they all have sufficient time to form positive judgments from the review of financial reports. There are other groups who use financial information that are not included, because their needs are highly individual or special, and cannot be considered in formuating a conceptual framework.

Based upon this configuration of users, the general nature of user needs for information is set up in four categories: (1) Financial Viability, (2) Fiscal Compliance, (3) Management Performance, and (4) Cost of Services Provided. *Financial viability* comprises more than the usual tests of solvency and liquidity; also involved are (a) the nature of resource inflows (the degree of confidence that the resource-flows from given sources may be depended upon to continue at given levels) and (b) resource transferability (whether resources can be transferred to achieve various purposes, or whether they are restricted to specified activities). In part, viability

> is indicated by the relationship between resource inflows and resource outflows during a period. This is analogous to the concept of "earnings" in a business enterprise, which also shows the difference between resource inflows (*i.e.*, revenues and gains) and resource outflows (*i.e.*, expenses and losses) (p. 49).

But on the immediately preceding page, the "earnings" concept was rejected:

> In analyzing the type of information needed by those interested in nonbusiness organizations, this approach [earnings] seems inadequate for two reasons. First, earnings, or profitability, as such is not an appropriate concept in a nonbusiness organization, almost by definition. Second, the groups of users identified in the preceding section have needs that cannot be satisfied by an "earnings" amount, or by a number that is analogous to it (p. 48).

Fiscal compliance refers to the spending mandates legally prescribed, (appropriations, or conditions with respect to grants) or by expressed intentions of the governing body. Users seek assurance that these mandates have been complied with, and that resources have been used for the intended purposes. *Management performance* is a matter of

> how well the money was spent, to the extent that accounting can shed light on this. (The terms "stewardship" and "accountability" are often used for this idea, but these terms are used by some people to refer to compliance only.) (p. 50).

Thus, user needs for information about management performance are merely mentioned; since budgetary information has been excluded from consideration, it is difficult to see how users could appraise performance except by using cost of services performed, which is discussed as follows:

> Citizens are interested in how much their government spends for recreational facilities as compared with roads. Prospective donors may be interested in the amount a college spends for its library compared with its athletic program. . . . Creditors, for example, may have doubts as to the long run viability of an organization that spends what is believed to be an inordinate amount for administration. . . . [U]sers also need program spending information that has a time dimension. They need to know whether current constituents receive an equitable amount of services as contrasted with that which is to be provided to future constituents (pp. 50–52).

To the writer, it seems obvious that this emphasis on comparison really suggests the clear superiority of *expense* (rather than expenditure) as a measure of current period costs. The report, however, passes over this point in the attempt to remain "neutral."

The chapter closes with some observations on the difficulty of measuring goal attainment as expressed in money; the lack of unanimity as to the items included in user needs and their relative importance; and the limitations of financial reports in the attempt to report such things as the reputation of the organization, the ability of its personnel, and the quality of the services provided.

Chapter 3 is concerned with how financial reports can best meet the needs of users. First, there is a summary of the general contents of the three basic financial reports used in the business area—the Income Statement, the Statement of Changes in Financial Position, and the Balance Sheet. The Balance Sheet is here viewed as of minor importance; when that issue is raised (No. 14, discussed at p. 114f.), Anthony concludes:

> In short, no conceptual issue that is peculiar to the balance sheet has been identified. This may, however, be an oversight. In order to provide an opportunity to raise and discuss issues that may exist, the following is included in the list of issues: . . . Are there conceptual issues related to the balance sheet? (p. 115).

The author's position is that a thorough consideration of the various flow statements would answer the question of how things might appear (and what should appear) on a Balance Sheet.

Ten definitions are presented as special terminology (four of which were discussed at length in Chapter 1 (pp. 30–31). These are condensed here. *Financial Resource Inflows* are all financial resources made *available*, [reviewer's italics] during an accounting period that increase an organization's equity. They consist of *Operating Inflows* and *Capital Inflows*. Operating Inflows are related to operations of the current period and include (1) *Revenues* and (2) *Other Operating Inflows*. (Gains and losses are excluded for simplicity.) Revenues are amounts realized in exchange for goods and services during the current period. Other operating inflows (Non-revenue inflows) include "all operating inflows other than revenues." (After giving examples, the author adds, "to the extent that these inflows are related to the operating activities of the current period") (p. 61). *Capital Inflows* include "all financial inflows other than operating inflows" but again, after giving examples, a phrase is added: "to the extent that these [capital] inflows are intended for the benefit of activities of future periods" (p. 61). *Asset Conversions* are transactions that "convert an asset or liability into another asset or liability but that do not result in a change in the organization's equity" (p. 61). *Expenses* are the "monetary measure of the amounts of goods and services used for operating activities of the current period" (p. 61). *Expenditures* are the "monetary measure of the [total] amounts of goods and services acquired during the current period, whether or not used in operating activities of that period" (p. 61). *Operating Statement*—A report showing "operating inflows, expenses, and the difference between them during the current period" (p. 61). A *Financial Flow Statement* reports "*some or all* [reviewer's italics] of the financial resource inflows, expenditures, and/or asset conversions during the current period" (p. 61). (The italics added by the reviewer cover the case illustrated as Statement F (p. 65) and further discussed herein, below, p. 581 of this paper.) The definitions of expense and expenditure are worth a comment. The cost of goods and services used during a period would include depreciation as a cost of using an asset during the period, as well as the cost of future payments which will be required to compensate employees for vacations, leave pay, or pensions *earned* during the period even though they may be payable in the future, one or many periods hence. Expenditure would not include these items, but would include purchased goods in inventory at the end of the current period.

This terminology is applied to a number of illustrative reports, the first of which is an Operating Statement which is *not* a "financial flow statement," *i.e.*, one which recognizes current period costs measured as *expenses*. To distinguish this from the other (financial flow) reports, the operating statement has no identifying symbol other than its title, while the financial flow statements are lettered A, B, C . . . F.

The Operating Report shows Revenues (400), Endowment Earnings (80), Grants for Operations (60), and Total Operating Inflows (540). This amount is reduced by Expenses (510) to arrive at "Operating Excess" (30). "Operating Excess" unfortunately suggests redundance, indulgence, or superfluity. It might have been replaced by "increase in Current Equity from Operations," or, more simply, "Operating Margin."

Financial Flow Statement A begins with the "Operating Excess" from the operating statement and adds "Noncash Expenses" (20) to obtain 50 as Total from Operations. To this are added Increase in Borrowing (38) to show Total Sources (88). Additions to Inventory (55) and Transfers to Plant (40)—a total of 95—are subtracted from the Total Sources (88) to arrive at a Decrease in Cash (7). The "Transfer to Plant" suggests that there may be a plant "group of accounts," but there is no other mention of that possibility.

Financial Flow Statement B is one that could be used to replace the operating statement by integrating its content within it. But the expense data in the first operating statement are replaced by expenditure data. Thus, while the Operating Inflows remain at 540, total Expenditures are 545, and the Inflow from Operations becomes an *Out*flow of 5. This outflow is covered by the Increase in Borrowing (38), making the net Total Sources (33). Deducting the Transfers to Plant (40) (but *not* the Addition to Inventory (55), which was included in operating expenditures), the Decrease in Cash is again 7.

Financial Flow Statement C is in another form, showing three funds. The Operating Fund is represented only by the label, "Same as A or B." But Statement A showed Inflow from Operations (50)—adding Depreciation (20) to Operating Excess (30), while Statement B showed Operating *Outflows* of 5. Statement B omits Additions to Inventory (55) since it is included in Operating Expenditures. These items offset each other, but it is confusing to treat them this way, having the remainders taken care of in a separate report.

Statement C is different from the earlier ones, as transactions are added to the discussion. There are now Endowment Gifts (140) added to the Monetary Capital Flows Fund, together with Endowment Income (70), and Endowment Gains (20), which total to 230 of Inflows to that Fund. The outflow consists of only the 80 previously included as Endowment Earnings in the Operating Inflows. The Plant Fund also has two additional transactions, Additional Borrowing (25) and Grants for Plant (70). Thus, the "Plant Fund" part of Statement C combines the Additional Borrowing (25) and Grants for Plant (70) with the Transfers of 40 shown in earlier reports to get Total Sources of 135. A deduction for Depreciation of (20) reduces the Plant Increase to 115. Note that the 20 of depreciation is an *expense* in the plant group of accounts, but does not affect operations in any way. Operating expenditures in Statement B were 545, which is expense of 510 plus inventory additions of 55 *minus* depreciation of 20. This is the correct *expenditure* figure, but it does *not* include depreciation.

There is still another difficulty here. The reader may have noticed that Endowment Earnings (80) (in the *operating* statement) has become Endowment Income (70) in the Monetary Capital Flows. Evidently some of the 70 income plus 20 gains was retained in the Monetary Capital Flows Fund, in the form of cash.

Financial Flow Statement D arranges Revenues (400), Endowment Income and Gains (90), Endowment Gifts (140), both Operating and Plant Borrowing (63), and both Current and Plant Fund Gifts (130) to produce Total Sources (823), less the sum of Operating Expenditures (545), Endowment Fund Investments (of Gifts) (135), and Plant Additions (126), or 806 for Total Uses, to yield a Cash Increase of 17. The Investment of Endowment Gifts (135) and the Plant Additions of (126) are new items; they were not in Statement C. The Cash Increase (17) is explained as the sum of Endowment Cash Increase (15) and Plant Cash (9), less the Decrease in Operating Cash (7).

Financial Flow Statement E is an aggregated statement (which shows the consolidation of all funds; it is set up to be accompanied by an Operating Statement). Because of this, it begins by adding "Operating Excess" (30), and Depreciation (20) to show the Total from Operations (50). The other inflows are Endowment Income (10)—the net after eliminating the Transfer to Operations (80)—Endowment Gifts (140), Additional Borrowing (63) and Grants for Plant (70), to show Total Sources (333). The uses are: Additions to Inventory (55), Additional Investments (135), and Additional Plant (126), a total of 316, which leaves the Net Increase in Cash (17). These totals, 333 (Sources) and 316 (Uses), are considerably smaller than those shown in Statement D, because the Sources in the Operating Statement were left out by showing only the Net Operating Excess added to depreciation, as in Statement A, to show 50 of Sources from

Operations. Allowing for this, the difference in Total Sources is explained—823 less 333 is 490, the amount of Total Inflows in the Operating Statement; but although the Endowment Earnings (80) was eliminated in the aggregation, the Grants for Operations (60) should not have been eliminated, for it was not an interfund transfer. The Total Sources must be 393, not 333.

Applying the same approach to the Total Uses, reducing it by 430 to correct for the 60 error in excluding grants, we get 806 − 430 = 376, the indicated amount of Uses as corrected. This result would show the Increase in Cash as 393 − 316 or 77, not 17, as stated; something else is amiss. The answer is that Statement E started with the Total from Operations as 50, taken from Statement A (based on the original Operating Statement), when it should have used the expenditure-based figures from Statement B, which shows the difference between Operating Inflows (540) and Expen*ditures* (545) as an outflow of 5, instead of the inflow of 50 in Statement E. This difference would bring the Cash Increase to 17, the correct amount, but the 55 of Additions to Inventory (shown *explicitly* in Statement E) would then not have been shown there; in an expenditure-based report, that item is included in Operating Expenditures as in Statement D, not as a separate "Use" as in Statement E. While all this may seem trivial, this reviewer sees it as a reasonable argument against the use of different concepts and financial reports (especially the latter) for non-business and business organizations.

Financial Flow Statement F. This method of presenting the result of activities for a period in a non-business organization reflects a basic difference from any of the preceding examples. It starts by adding Revenues (400) and Endowment Income and Gains (90)—leaving out the transfer this time—to get a "subtotal" (490). Expenses (510) are subtracted from this amount to leave an unlabeled deficit of 20. This, in turn, is covered by adding Gifts for Operations (60) to produce "Operating Excess" of 40. Capital Gifts—for Endowment (140 and for Plant (70)—total 210, are added to produce Increase in Capital (250). Borrowings of both kinds (63), the Additional Endowments (135), and the New Plant (126) do not appear. An explanation of the "Increase in Capital" (250)—not furnished in the text—is:

"Operating Excess" per expense-based computation;		$ 50
Less Cash Income retained in Endowment Fund		10
Operating Excess per Statement E		$ 40
Add: Gift to Increase Endowment	$140	
Gift to Finance part of New Plant	70	210
"Increase in Capital"		$250

The Total Increase in Capital (even by the definition implied) is 260, not 250. The 10 Cash left in the Endowment Fund is Income, and it is as much an Increase in Capital as Revenue less Expense. Whether Borrowings of 63, Plant Additions of 126 and Cash Income of 10 ought to be ignored in a Financial Flow Statement is not, in this reviewer's opinion, a moot question!

The remainder of the report is devoted to the discussion of 14 remaining issues, which are listed here as they appear in the report:

Issue Three	Do users need a report of operating flows that is separate from a report of capital flows?
Issue Four	Do users need an operating statement?
Issue Five	Do users need a report of cost of services performed?
Issue Six	Should financial flow statements report encumbrances as well as, or instead of, expenditures?

Issue Seven	Do users need a single, aggregated set of financial statements for the organization rather than separate financial statements for each fund group? If the latter, what criteria should determine the composition of fund groups?
Issue Eight	Are there conceptual issues related to the balance sheet?
Issue Nine	How should the nonrevenue operating inflows of an accounting period be measured?
Issue Ten	How should endowment earnings be measured?
Issue Eleven	Under what circumstances, if any, should a charge for the use of capital assets be recorded as an item of spending?
Issue Twelve	Should pension costs be accounted for as spending in the period in which the related services were rendered?
Issue Thirteen	Under what circumstances, if any, should donated or contributed services be reported as an item of expense at their fair value?
Issue Fourteen	How, if at all, should business organizations be distinguished from other organizations for the purpose of developing accounting concepts?
Issue Fifteen	Should the federal government and/or state governments be excluded from the applicability of financial accounting concepts for non-business organizations?
Issue Sixteen	Should a single set of concepts apply to all types of non-business organizations, or should there be one set for governmental organizations and one or more additional sets for non-governmental, non-business organizations?

Issues Three through Eight are discussed in the remainder of Chapter 3, Issues Nine through Thirteen are dealt with in Chapter 4, and the last three are the focus of attention in Chapter 5. In the 125 pages or so used for these expositions, each of these 14 issues is thoroughly discussed in a general pattern, as follows: (a) introductory background, (b) statement of the issue, (c) arguments for each approach to that issue, (d) arguments against, and (e) comments of various kinds. This mode is in keeping with the intention expressed on page 29, where the author wrote the following about these issues:

> Background material . . . is intended to be entirely descriptive; if any value judgments are inferred, their inclusion is unintentional. . . . Relevant considerations relating to the issue are listed. Essentially, these are pros and cons for each of the alternative ways of resolving the issue.
>
> It should be emphasized again that the study stops at this point. There is no attempt to weigh the relative merits to the various pros and cons, and hence to arrive at a conclusion or recommendation on the issue. This is the task for the next stage, if and when the FASB decides to develop objectives and basic concepts. . . .

This approach has the result of bringing to the fore (so far as can be seen) every position that *could* be taken by anyone connected with the study. The fact that the 53 advisors listed immediately after the preface were drawn from various organizations would tend to sharpen the issues and bring up whatever pros and cons appeared to be relevant. The group contained eight CPA firm partners, five accounting educators, 12 from various governmental organizations, six from hospitals and other health and welfare institutions, four from investment firms, three finance officers of universities, three from foundations, two from church organizations, and each from ten other kinds of organizations, such as the Community Fund, a professional society, a pension fund, a museum, and a bank. With such a group of participants, one would expect that no large stone or even a small pebble would remain unturned. Some examples are given below, to elucidate:

> [T]hose who favor the "expenditure" approach may refer to either of two expenditure definitions. One group favors the budgetary expenditure approach in which expenditures are recorded only for those items for which appropriations or similar resources have been provided in the current period; they would

> omit, for example, pensions and other liabilities that do not come due until the future and that will be discharged by appropriations or other resources expected to be provided at that time. Those who favor this definition maintain that there is no reason to record a liability if no provision is made in a current appropriation for discharging this liability. . . .
>
> Those who favor the conventional definition of expenditures, in which all liabilities are recorded as soon as they exist, maintain that to do otherwise is to present misleading financial information (p. 84).

In discussing the problem of timing (largely solved in business accounting by the concept of realization), the report takes the position that (pp. 123 ff):

> In general, an asset is recorded when the organization receives either cash or the unconditional right to cash or to equivalent resources. . . . [that have a] high probability of being received. . . .
>
> The revenue recognition concept stated above is a generalization that is amplified, applied to specific situations, and even changed on an exception basis by accounting standards. For example, the recognition of revenue on certain types of long-term construction contracts, and for certain precious metals are exceptions to the basic concept. . . .
>
> Although there are differences of opinion on the treatment of specific types of operating inflows . . . , it is roughly accurate to say that there are two general approaches to the measurement of the amount of such [nonbusiness] inflows in an accounting period. These are here labeled the "matching" alternative and the "availability" alternative. . . .
>
> A useful way of sharpening the distinction between these two alternative approaches . . . is to examine the differences that would result in the recording of certain types of transactions.
>
> Assume that property taxes are levied in November 1977, are payable in 1978, and are to finance municipal services in 1978. In the matching alternative, these property taxes would be operating inflows in 1978. In the availability alternative, there is some doubt as to whether the property taxes should be counted as operating inflows in 1977 (on the grounds that the tax levy can be used as the basis of tax anticipation notes in 1977) or whether they should be counted as operating inflows in 1978 when they are actually payable. (This doubt would be resolved in an accounting standard.)
>
> . . . if dues intended to finance 1978 services were received in 1977, they would be operating inflows in 1978 under the matching alternative, but they would be operating inflows in 1977 under the availability alternative. Dues intended for 1978 activities not paid by the end of 1978, but for which payment is expected, would be operating inflows for 1978 under either alternative.

The subject of depreciation of capital assets occupies 13 pages in which the methodology related to computations is not an issue (in keeping with earlier exclusions). The following alternatives are proposed as background for discussion (pp. 137–38):

> 1. Do not depreciate assets. Omit depreciation expense from the operating statement.
> 2. Record depreciation expense when the corresponding grant, contract, or user charge for a service or program includes depreciation as one of the applicable elements of cost.
> 3. Record depreciation expense when the governing body intends to use the funds derived from operating activities to replace the assets being depreciated.
> 4. Record depreciation expense when the governing body intends to use funds derived from operating activities to replace the assets being depreciated *if* it sets aside in a special fund an amount equal to the depreciation expense.
> 5. Record debt service payments as an expense, in lieu of depreciation, for assets whose acquisition is financed by bond issues with a maturity substantially equivalent to the useful life of the asset.
> 6. Record depreciation expense for assets whose acquisition was financed by endowment funds when the depreciation amount is returned to the endowment fund.
> 7. Record depreciation on fixed assets to be acquired in the future, but do not depreciate fixed assets currently on hand.
> 8. Do not record depreciation for assets that constitute the organization's "infrastructure" (e.g., roads, dams, bridges, sewer and water distribution systems, educational

> buildings). Record depreciation for other depreciable assets.
>
> 9. Depreciate all depreciable assets, as in business organizations.
>
> . . . In discussing the above alternatives, some people make a distinction between real property and personal property. They tend to favor a depreciation mechanism for furniture, equipment, automobiles, and other personal property on the grounds that these items have a relatively short life and there is a relatively steady need to provide for their replacement . . . (pp. 138–39).
>
> Opponents of depreciation accounting recognize that under some circumstances the costs that are reimbursed through fees, grants, or contracts specifically include an allowance for depreciation or a charge for the use of facilities that amounts to the same thing. They deny, however, that this practice is a valid reason for reporting depreciation expense on the financial statements; the calculation of the reimbursement should be separate from financial reporting. They maintain that if the fixed assets were donated or appropriated in a capital budget, the effect of such a practice would be to collect double payment for them, once at the time of donation or appropriation for the asset acquisition, and the second time via user charges paid by current clients (p. 142).

With regard to Issue Fifteen, whether federal and/or state governments should be "excluded from the applicability of financial accounting concepts for nonbusiness organizations," some of the arguments are:

> Creditors . . . know that the unique power of the federal government to create money provides better assurance of repayment than can be inferred from any financial statement analysis. . . .
>
> . . . The national debt differs in its essential nature from the liabilities of other organizations; in particular, there is no expectation that the national debt is a meaningful claim on assets listed on an accounting balance sheet.
>
> The federal government is sovereign. The Comptroller General has statutory authority to set accounting standards for federal agencies. . . . It is therefore questionable whether any useful purpose is served by suggesting that concepts developed by another organization, such as the FASB, should be applicable to the federal government (p. 176).

CONCLUSION

This long and tedious discourse has taken liberties in correcting a few mistakes, offering some critical comments, and quoting extensively to present a sample—certainly not conclusive, perhaps inadequate, and possibly colored by the reviewer's own predilections, but nevertheless a sample—of what the report presents. The report is the culmination of much time and effort in producing it, and the problems dealt with are complex and difficult to evaluate. The author and those who helped him are to be commended for attempting to uncover the gaps that seem to exist between business-oriented accounting, and applications of it that are made to fit "non-business" situations. Those who will work through the report as the reviewer has done will gain at least a partial appreciation of what those gaps are, even if no ways can be found to bridge them.

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Notes

The Predictive Value of Interim Reports for Improving Forecasts of Future Quarterly Earnings

Lawrence D. Brown and Michael S. Rozeff

ABSTRACT: Estimates of future quarterly earnings are of prime importance to capital market participants for formulating their investment decisions. Superior ability to forecast future earnings may enable investors to reap extraordinary returns by trading in the affected securities. The extant forecast accuracy literature has presented convincing evidence that interim accounting data contain predictive value for improving forecasts of annual earnings. But by concentrating upon forecasts of annual earnings, past research has presented no evidence regarding the predictive value of interim data for improving forecasts of future quarterly earnings. Improved annual forecasts are not synonymous with improved forecasts of future quarterly earnings. As the year progresses, the annual earnings forecast generally can be significantly improved by substituting known interim data for their earlier predicted values, leaving intact previous forecasts of future quarterly earnings. By introducing an alternative methodology, evidence is presented that interim data have predictive value for improving forecasts of future quarterly earnings.

The importance of future quarterly earnings estimates to capital market participants is well known. Forecasts of future quarterly earnings are highly relevant for estimating future cash flows, a primary determinant of market value in both traditional [Fisher 1906] and modern [Sharpe 1964] asset pricing models. This paper examines how interim accounting reports are used by a class of capital market participants (security analysts) to revise and improve their forecasts of future quarterly earnings.

The seminal empirical studies of the predictive value of firms' interim reports [Green and Segall 1966, 1967] concluded that interim reports had little or no predictive value for improving forecasts of annual earnings. In contrast, later research [Brown and Niederhoffer, 1968; Coates, 1972; and Reilly, Morgenson and West, 1972] concluded that interim reports had predictive content for forecasting annual earnings. It can be shown that Green and Segall's findings are

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consistent with those of later research: all studies in the area have provided evidence that interim reports are useful for improving forecasts of annual earnings of the same year.[1]

Interim reports can lead to more accurate annual earnings forecasts in two ways: (1) substituting known quarterly earnings for forecasts made earlier of that portion of the year which has elapsed, and/or (2) improving forecasts of that portion of the year yet to pass.[2] Past studies have not distinguished or analyzed separately these two potential sources of predictive content of interim reports. Since incorporating known interim results into the annual earnings forecast as the year progresses (1) significantly improves annual earnings forecasts *per se* (see Table 2 below), improvement in the annual earnings forecast cannot be construed as meaning that interim reports help improve forecasts of *future* quarterly earnings (2). To ascertain whether interim reports help improve forecasts of future quarterly earnings, (1) and (2) must be analyzed separately. This study analyzes (1) and (2) separately.

Also in contrast to past literature, we use analyst forecasts, not forecasts of time series models.[3] The advantages of using analyst earnings forecasts are several: (1) Analyst forecasts are "objective" data produced outside the research process, and hence do not involve the subjectivity attendant to selecting particular time series models as forecast generators, (2) analyst forecasts are widely available for research purposes, (3) analyst forecasts are more accurate than forecasts of time series models [Brown and Rozeff, 1978], and (4) analysts are "real" capital market participants who use accounting reports. Moreover, their forecasts are purchased and used by other market participants.

The principal disadvantage of using analyst forecasts is that experimental control over the timing of the forecasts is not possible. The ideal experiment would compare the analyst's forecast error in predicting future earnings immediately before receiving the interim report with his/her forecast error made immediately thereafter. With published analyst data, however, time passes after the interim report is received, allowing the analyst to accumulate information from non-accounting sources.

In order to associate analyst forecast improvement with interim reports, therefore, the reports must be of major importance versus other information sources.

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[1] Numerous suggestions have been made to account for the "inconsistency" of Green and Segall's [1966, 1967] findings with those of later research: (1) unrepresentative time period, unrepresentative sample, ignores non-accounting information [Holton 1966]; (2) limited array of time series models [Green and Segall, 1967; and Brown and Niederhoffer, 1968]; (3) same time series model fit to all firms [Coates, 1972]; (4) use of time series models *per se* [Abdel-khalik and Espejo, 1978]; (5) improper measures of forecast error [Green and Segall 1967]; and (6) use of only the first interim report [Holton, 1966 and Brown and Niederhoffer, 1968]. To see that Green and Segall's [1966, 1967] results are not inconsistent with later findings, we use Green and Segall's published data [1966, pp. 31–32]. In their 44-firm sample, their most accurate interim model (14) produced smaller forecast errors than their most accurate model not using interim data (A1) 32 times, and larger errors only 11 times. Green and Segall used three error measures, root mean square error, mean square error, and root relative error squared, but did not conduct tests of significance. Nevertheless, they concluded that interim reports lacked predictive value for improving annual forecasts. Applying Wilcoxon Matched Pair tests [Conover, 1971] to Green and Segall's 44-firm sample, we obtained t-statistics of 3.10, 3.22 and 3.30, respectively, for their three error matrices. Since these t-values are all significant at the .01 level, we conclude that Green and Segall's results are consistent with those of later authors.

[2] For an excellent analysis of the approach of comparing two actual forecasts of annual earnings, one made conditional upon more interim data than the other, see Barnea, Dyckman and Magee [1972].

[3] Recent related studies which investigated security analyst annual earnings forecasts (*e.g.*, Abdel-khalik and Espejo [1978] and Crichfield, Dyckman, and Lakonishok [1978]), did not distinguish or analyze separately the above-mentioned two sources of predictive content of interim reports.

There is ample evidence that interim reports are of major significance to analysts, so that we need not simply assume that these data are of major importance. It has been shown [Brown and Rozeff, 1978, p. 13] that the information obtained by analysts between the most recent quarterly report and the subsequent analyst prediction has a negligible effect on the analyst's ability to predict future quarterly earnings. In addition, Cragg and Malkiel [1968] and Pesando [1975] have provided evidence that analyst forecasts are significantly correlated with the past time series of the variable being forecast.[4]

SAMPLE AND FORECASTS

Our sample is comprised of the 50 firms used in Brown and Rozeff [1978]. Each firm was randomly selected from *Moody's Handbook of Common Stocks* and met the three criteria: complete quarterly earnings data are available since 1951, the fiscal year ends in December, and the firm is included in the *Value Line Investment Survey* since 1971.[5]

The analyst forecasts are Value Line forecasts, by firm, for each of the five years, 1972 to 1976. *Value Line Investment Survey* is published in 13 weekly installments and provides quarterly and annual earnings forecasts for each firm it surveys. Its quarterly forecasts are denoted (omitting a subscript for firm):

$Q_{jt}|Q_{it}$ = analyst earnings per share forecast of quarter j of year t conditional upon i interim reports of year t, $j=1, 2, 3, 4$, $i=0, 1, 2, 3$.

For example, the three analyst forecasts of third quarter earnings per share of year t, $Q_{3t}|Q_{0t}$, $Q_{3t}|Q_{1t}$ and $Q_{3t}|Q_{2t}$, are conditional upon zero, one and two interim reports, respectively.

Value Line's annual forecasts (A_is) are sums of its quarterly forecasts. These are denoted:

$$A_i = \sum_{j=1}^{4} Q_{jt}|Q_{it}, \quad i = 0, 1, 2, 3. \quad (1)$$

Note that for $j \leq i$, $Q_{jt}|Q_{it} = Q_{jt}$, since actual quarterly earnings per share are known at these times.

METHODOLOGY

Consider two forecasts made by an analyst, his/her annual forecast made conditional upon no interim data of the year being forecast, A_0, and his/her annual earnings forecast made conditional upon the first interim report, A_1. Since $Q_{1t}|Q_{1t} = Q_{1t}$, A_1 can be expressed as:

$$A_1 = Q_{1t} + \sum_{j=2}^{4} Q_{jt}|Q_{1t} \qquad (2)$$

or, equivalently:

$$A_1 = A_0 + (Q_{1t} - Q_{1t}|Q_{0t}) + \left(\sum_{j=2}^{4} Q_{jt}|Q_{1t} - \sum_{j=2}^{4} Q_{jt}|Q_{0t}\right). \quad (3)$$

In words, the annual forecast conditional upon the first interim report is the annual forecast conditional upon no interim reports plus (1) the *substitution* of the known first quarter number for its predicted value, and (2) the *revision* of forecasts of future quarterly earnings, those of quarters two through four.

Past studies tested and showed that A_1 is more accurate than A_0, but did not analyze the substitution and revision terms separately. To analyze separately the substitution and revision effects, we define a constructed analyst annual forecast conditional upon the first interim report which incorporates substitution only; that is, it does not allow for revision of future quarterly earnings:

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[4] Similar findings were also obtained with our data. Regressing analyst forecasts on the forecasts of time series models for each of our sample firms, we obtained a median R^2 of 0.69, closely corresponding to Cragg and Malkiel's [1968] correlation coefficients of 0.8 and 0.9 between analyst forecasts and those of time series models.

[5] The basic earnings data were quarterly primary earnings per share before extraordinary items, adjusted for stock splits, stock dividends, and other capitalization changes. See Brown and Rozeff [1978, pp. 14–15] for a list of the firms.

$$C_1 = A_0 + (Q_{1t} - Q_{1t}|Q_{0t}). \quad (4)$$

To see whether substitution of the first interim number for its forecast *per se* produces more accurate earnings forecasts, we compare the forecast accuracy of C_1 with that of A_0. To determine whether the first interim report helps analysts improve their annual forecasts by allowing them to improve forecasts of future quarterly earnings, we compare A_1 (which incorporates revision) with C_1 (which does not).

To generalize this procedure for the second and third quarters, define:

$$C_i = A_{i-1} + (Q_{it} - Q_{it}|Q_{i-1,t}), \quad i = 1, 2, 3. \quad (5)$$

Therefore, to test the *substitution* effects of the second and third quarter numbers, we compare C_2 with A_1 and C_3 with A_2, respectively; to test the *revision* effects of the second and third quarter numbers, we compare A_2 with C_2 and A_3 with C_3, respectively.

RESULTS

Let EPS = actual annual earnings per share and FEPS = forecasted annual earnings per share. Then define forecast error as $|(\text{EPS} - \text{FEPS})|/|\text{EPS}|$. Allowing for missing data, the 50 firm/five-year sample generates 234 annual errors for each of the seven forecast methods, A_i ($i = 0, 1, 2, 3$) and C_i ($i = 1, 2, 3$). The cross-sectional error distributions of these seven error vectors appear in Table 1.

First-order stochastic dominance is revealed by the cumulative distribution functions (CDFs) of A_0, A_1, A_2 and A_3 with $\text{CDF}(A_3) < \text{CDF}(A_2) < \text{CDF}(A_1) < \text{CDF}(A_0)$ at all deciles. Hence, these results are consistent with past findings that each interim report has predictive value for improving the forecast accuracy of the annual earnings per share number.[6] The question remains, do interim data have predictive value due to their substitution or to their improvement aspects?

By comparing C_i with A_{i-1} and A_i with C_i it is seen that substituting known quarterly data for their earlier predicted values and revising (and improving) future forecasts *both* contribute to improved annual predictions. Note that $\text{CDF}(C_1) < \text{CDF}(A_0)$ at all deciles, $\text{CDF}(C_2) < \text{CDF}(A_1)$ at all but the ninth decile, and $\text{CDF}(C_3) < \text{CDF}(A_2)$ except at the first, second and ninth deciles. These results suggest that substitution *per se* improves forecast accuracy. For all i and at all deciles, $\text{CDF}(A_i) < \text{CDF}(C_i)$, indicating that the annual earnings forecast also improves due to the revision and improvement of forecasts of future quarterly earnings.

To test whether the median difference between two error distributions is significantly different from zero, we conduct Wilcoxon Matched Pairs tests.[7] We first examine the substitution aspect. Table 2 contains the t-statistics from Wilcoxon tests of C_i with A_{i-1}, $i = 1, 2, 3$ for each sample year and all years combined. It is seen that significant improvements in annual earnings forecasts can almost al-

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[6] Green and Segall [1966, 1967] and Brown and Niederhoffer [1968] tested "interim" models against "annual" models to determine if interim data enhanced the predictability of annual earnings. Their most accurate interim model was, however, C_1 which involves *no revision* of future earnings. The conclusion that interim data have predictive content has therefore rested solely (until now) on the substitution effect of replacing the first-quarter forecast by its realization.

[7] Other error measures (*e.g.*, relative error squared, mean square error, and root mean square error) would yield similar results using the Wilcoxon test. See Brown and Rozeff [1978, p. 3] and footnote 1 above.

TABLE 1

DISTRIBUTIONS OF FORECAST ERRORS, 1972–1976, SAMPLE SIZE=234

	Decile Values of Forecast Errors								
Forecast	*.10*	*.20*	*.30*	*.40*	*.50*	*.60*	*.70*	*.80*	*.90*
A_0	2.48	6.17	9.10	12.52	16.13	22.36	30.28	38.27	80.18
C_1	2.29	4.88	6.85	9.60	13.90	19.10	27.15	36.18	67.50
A_1	1.65	3.36	5.60	7.91	10.75	14.68	20.48	30.45	49.47
C_2	1.58	3.15	4.55	7.00	9.95	13.19	19.17	25.57	51.31
A_2	0.58	1.77	3.23	4.83	6.45	9.08	13.64	22.50	35.14
C_3	0.93	2.01	2.90	4.32	5.64	7.80	11.14	16.67	40.00
A_3	0.47	1.24	1.84	2.55	3.59	4.62	7.00	10.61	19.50

TABLE 2

IMPROVEMENT IN FORECAST ACCURACY DUE TO SUBSTITUTING KNOWN QUARTERLY NUMBERS FOR THEIR PREDICTED VALUES

	Time Period					
	1972	*1973*	*1974*	*1975*	*1976*	*1972–1976*
Sample Size	*48*	*46*	*46*	*49*	*45*	*234*
			A: First Interim Report[c]			
Number of Revisions	48	46	45	49	45	233
Number of Improvements	36	38	36	31	27	168
Wilcoxon *t*-statistic	3.96[a]	4.79[a]	4.13[a]	3.19[a]	1.60	7.72[a]
			B: Second Interim Report[d]			
Number of Revisions	48	46	45	49	45	233
Number of Improvements	32	41	34	40	36	183
Wilcoxon *t*-statistic	3.70[a]	5.17[a]	3.84[a]	4.55[a]	3.20[a]	9.09[a]
			C: Third Interim Report[e]			
Number of Revisions	48	46	46	49	45	234
Number of Improvements	34	38	36	42	40	190
Wilcoxon *t*-statistic	3.64[a]	4.98[a]	3.74[a]	4.78[a]	4.36[a]	9.68[a]

[a] Significant at .01 level (one-tailed test).
[b] Significant at .05 level (one-tailed test).
[c] Compares C_1 with A_0.
[d] Compares C_2 with A_1.
[e] Compares C_3 with A_2.

ways be obtained by merely substituting known interim data for predicted values and leaving unchanged the forecasts of future quarterly earnings. The results are significant at the 1 percent level in 14 of the 15 sample tests. We next examine the revision aspect. Table 3 contains the *t*-statistics from Wilcoxon tests of C_i with A_i, $i=1, 2, 3$. Ten of the 15 tests display statistical significance, and the other five have *t*-values between 1.08 and 1.62. There is, therefore, strong statistical support for the hypothesis that interim accounting data have predictive content for improving forecasts of future quarterly earnings.

TABLE 3

IMPROVEMENT IN FORECAST ACCURACY DUE TO REVISING FORECASTS OF UNKNOWN QUARTERLY NUMBERS

	1972	*1973*	*1974*	*1975*	*1976*	*1972–1976*
Sample Size	*48*	*46*	*46*	*49*	*45*	*234*
			A: First Interim Report[c]			
Number of Revisions	47	44	46	49	42	228
Number of Improvements	23	32	28	38	29	150
Wilcoxon *t*-statistic	1.08	3.56[a]	2.46[a]	4.21[a]	1.54	5.89[a]
			B: Second Interim Report[d]			
Number of Revisions	42	42	45	46	44	219
Number of Improvements	26	30	25	35	28	144
Wilcoxon *t*-statistic	1.62	3.71[a]	1.60	4.45[a]	1.53	5.74[a]
			C: Third Interim Report[e]			
Number of Revisions	44	45	45	46	43	223
Number of Improvements	33	35	29	35	32	164
Wilcoxon *t*-statistic	2.47[a]	4.37[a]	1.92[b]	4.21[a]	4.12[a]	7.57[a]

[a] Significant at .01 level (one-tailed test).
[b] Significant at .05 level (one-tailed test).
[c] Compares A_1 with C_1.
[d] Compares A_2 with C_2.
[e] Compares A_3 with C_3.

SUMMARY

Previous empirical studies of the predictive value of firms' interim reports for forecast improvement have asked whether interim reports have predictive value for improving forecasts of *annual* earnings of the same year. We asked whether interim reports have predictive value for improving forecasts of *future* quarterly earnings. These two questions are not the same: a forecast of annual earnings can be improved upon receipt of interim reports either because known quarterly earnings replace earlier forecasts of that portion of the year which has passed, and/or because interim reports are used to revise and improve forecasts of that portion of the year yet to pass. The latter facet of predictive value is of major interest to capital market participants since forecasts of future quarterly earnings are a prime determinant of capital asset prices.

Using security analyst earnings forecasts, we have shown that interim reports are associated with a significant improvement in the annual earnings forecast, a result consistent with past studies. More importantly, we have demonstrated that the improved annual earnings forecast is due to both (1) substituting known quarterly earnings for their earlier predicted values and (2) revising and improving forecasts of future quarterly earnings.

As a caveat, we note that the results were obtained using published security analyst forecasts. While these data have several advantages over time series forecasts, their principal disadvantage is that quarterly reports are not the only information source available to security analysts. Thus, it must be recognized that the improved forecast accuracy found above may not be attributable entirely to interim accounting data, but in part may be due to other sources of information.

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EDITORIAL

Theory and "Intermediate" Accounting

I am concerned about the "intermediate" financial accounting course. An acceleration in the issuance by standard-setting bodies of highly specific and definitive accounting pronouncements has burdened "intermediate" textbooks and "intermediate" courses with what has come to be called "legal accounting." In effect, the actions of professional standard-setters have transformed the "intermediate" course from a mixture of theory and practice to an undiluted indoctrination in the practices recommended in Opinions, Statements, Interpretations, Accounting Series Releases, Staff Accounting Bulletins, and Statements of Position.

What should be the role and function of the "intermediate" course in the accounting curriculum? It is time that the objectives and content of this offering be carefully reconsidered and redefined, and I think it would be helpful if the American Accounting Association or another sponsoring body would convene a conference on the subject.

Beginning in 1967, when the active period of the Accounting Principles Board may be said to have commenced, accounting pronouncements, in the United States at least, began to pour forth as never before. They began to address controversial questions, and, more frequently than not, their recommendations were arbitrary resolutions of problems whose answers were not known or knowable—especially without objectives or a body of guiding, coherent accounting theory. Beginning in 1972, the Securities and Exchange Commission joined the parade, and the Financial Accounting Standards Board and the AICPA's Accounting Standards Executive Committee have proven to be worthy successors to the APB. Consequently, a mountain of complex pronouncements stands where a molehill of fairly simplistic bulletins once stood. The challenge to the accounting teacher is to decide how the essential content of these professional recommendations should be conveyed to the student.

In these remarks, I confine myself to the task of educating the prospective accounting professional. Doubtless the question would be answered differently if one were concerned with educating the diverse users of financial reports. The case method of instruction might be proposed for this purpose.

To some considerable degree, the issue of what to do about "intermediate" accounting is confounded by discord over the relative weights to be assigned in the accounting curriculum to (1) preparing students to pass the Uniform CPA Examination and (2) preparing students for longer-term assignments in the profession. The profession has beyond any doubt been buffeted by change during the last decade. As it is more difficult now than ever before to be confident of the challenges which will face accounting professionals in the 1980s and 1990s, one wonders whether a curriculum that does little more than inculcate in students a sense of *current* practice will serve them well in future years. The CPA Examination typically tests one's understanding of extant practice, with, to be sure, some emphasis on existing controversies. But the Examination is predominantly a gauge of the candidate's understanding of "what is."

Prior to the mid-1960s, the "what is" in accounting was so generally defined in pronouncements that it could be summarized quite comfortably in the curriculum while still allowing time, if such was the intent, to discuss theory. Moreover, many universities then offered credit courses in "CPA Review," which relieved some of the pressure on the "intermediate"-"advanced" sequence to cover everything there was. Today, the CPA coaching courses, offered in almost every major population center, have supplanted the CPA Review credit courses, and accounting education has moved closer toward legal education, which has long been complemented by post-graduate Bar review courses.

I am frankly concerned that accounting teachers have placed almost the entire burden of conveying the contents of the most controversial (and, frequently, the most complex) accounting pronouncements on the "intermediate" course—leases, pensions, income tax allocation, replacement cost/GPL accounting, revenue recognition, goodwill, research and development, earnings per share, among others—that precious little time remains for acquainting students with a theory of the field which they are about to enter. How many accounting teachers can be found who would not confess that their "intermediate" course is bursting at the seams with technical pronouncements?

One reaction to this predicament has been to expand "intermediate" from three semester hours to four, or from one course to two (with equivalent actions taken by those on the quarter system). The result, however, is only that more pronouncements can be covered, and theory continues to be relegated to an optional seminar. And how many curricula contain such a seminar, even at the master's level? Typically, such seminars are offered in the final semester of the course of study, when many students are preoccupied with getting a job and preparing for the CPA Examination—neither of which mixes well with excursions into the world of theory.

Theory should come at the front, not only at the back of the curriculum. It should provide a framework within which students might endeavor to rationalize (if they can) and assess extant practice, and it should help them to be informed critics and interpreters of exposure drafts and pronouncements yet to come—and for other kinds of change. For those who aspire to leadership roles in the profession, theory (and an appreciation of *how to read* the theory literature) should enable them to make wiser policy decisions. Theory in both the normative and positive senses should be taught as an integral (and early) part of the accounting curriculum, and it should draw not only on textual materials but also on articles from the literature.

I do not propose that so-called "legal accounting" should not be taught in university accounting curricula. I do, however, insist that instruction in "legal accounting" should not drive out instruction in the theory of one's field. And I contend that the trend in "intermediate" courses has *de facto* done just that in many American universities in the last decade.

Are students to be encouraged to believe that accounting has no theory worth learning, or that the only "theory" is the amalgam of authoritatively recommended practices (as of a given moment)?

More than 25 years ago, Baxter [1953] warned that "recommendations on accounting theory" could ossify the discipline. He wrote [p. 410]:

> [Such recommendations] are likely to weaken the education of accountants; the conversion of the subject into cut-and-dried rules, approved by authority and not to be lightly questioned, threatens to reduce its value as a subject of liberal education almost to *nil.*

On the content of the "intermediate" course, Mautz has written:

> [N]o course in a college or university should be aimed at merely presenting a mass of factual detail or procedure for memorization by the student. Emphasis should be on reasoning and the development of a student's ability to think in terms of accounting ideas. This again suggests the importance of basic theory and the usefulness of a knowledge of the functions and limitations of accounting. To bury this desirable emphasis under a mass of factual legal and accounting detail would do little to advance a student's reasoning ability [Mautz, 1951, p. 243].

I was provoked to write this Editorial upon reading a review written by an Australian accounting academic of a recent edition of a well-known American "intermediate" textbook. After contrasting the American approach of dwelling on existing practice with the Australian preference for concentrating on theoretical structure, the reviewer somewhat cynically writes,

> To their credit, the present authors have dared to differ [with the authoritative pronouncements] on some issues, but the impression remains that teachers will concentrate on working through the text and that the spirit of inquiry and debate expected in tertiary institutions may be missing from intermediate accounting. There is little time for free debate and, anyway, the issues appear to have been resolved [Martin, 1978, p. 81].

The reviewer had taught an earlier edition of the textbook in an American university.

I am encouraged that some writers are thinking constructively about this problem. Wilson [1979] presents an interesting proposal in the Education Research section of the April issue.

Although my specific concern here is with the "intermediate" accounting course, any sound solution must have implications for the entire financial accounting curriculum. The answer to this curriculum question must not be allowed to be dictated by an ineluctable trend in the standard-setting process. Educators must once again become masters in their own households.

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EDUCATION RESEARCH

Edwin H. Caplan, Editor

EDITOR'S NOTE

Manuscripts submitted to this section should conform to the format described in the April, 1978, issue of THE ACCOUNTING REVIEW. The articles should fall into one of four categories: (1) articles that report empirical research findings regarding learning theory and technique applied in accounting courses at the collegiate level of instructions; (2) articles that report on developments in the field of accounting education, such as those dealing with educational philosophy or descriptive innovations for the classroom; (3) articles dealing with professional development; and (4) articles dealing with practical or theoretical issues directly related to classroom instruction, *i.e.*, providing specific classroom applications.

All manuscripts and correspondence should be sent to Professor L. S. Rosen, York University, 47 Mogul Drive, Willowdale, Ontario M2H 2M8, Canada.

Computer Extended Reciprocal Allocation Methods

William F. Bentz

ABSTRACT: The learning objectives and the major features of a computer extended instructional system called CAL are described in this paper. The system consists of an interactive program, instructions, and several exercises. The overall objective of CAL is to improve the transfer of learning from the classroom to the practice of accounting without significantly increasing the homework burden of students. The subject matter to be learned is the reciprocal allocation model used in managerial and financial accounting to determine the costs or earnings of reciprocally related entities. CAL contributes to increased learning transfer by making it possible to put more emphasis on problem formulation and solution interpretation and less on solution computation. With CAL one can formulate and solve a variety of problems in a short time. Experience indicates that testing, course planning and faculty-student interactions will change if an interactive system such as CAL is implemented in accounting courses.

THE purpose of this paper is to describe the learning objectives and the major features of an interactive computer extended instructional system called CAL that facilitates the learning of several related accounting topics in allocation theory. In particular, this system facilitates one's learning how to formulate, solve and interpret the solutions to the linear equations that are the basis of: (1) the reciprocal method of allocating historical costs among interrelated activities, (2) the determination

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of predetermined overhead rates that are based on the standard or the budgeted costs of interrelated activities, (3) the incremental costing of interrelated activities, (4) the costing of the outputs of sequentially related activities, and (5) the distribution of income among reciprocally owned accounting entities. Learning is extended in the sense that greater transfer of learning is achieved with the aid of CAL, or a functionally equivalent system, than is likely to be achieved using pencil and paper methods.

The learning objectives associated with CAL involve both the cognitive and the affective domains of learning.[1] In the cognitive domain, the objective is to achieve a more advanced level of learning, to achieve "application" rather than just "knowledge" as defined by Bloom *et al.* [1956]. To be able to apply an accounting method or technique in a different learning context, or to be able to solve a practical problem, requires a higher level of cognitive learning than does the solution of test problems that resemble homework problems. In the affective domain the objective is to develop positive attitudes towards the use of computers to solve professional accounting problems. Positive attitudes can be expected to develop from successful, personal experiences that involve meaningful applications of computer technology to solve practical accounting problems.[2]

This paper begins with a discussion of the learning objectives and characteristics of CAL. This discussion is followed by a description of the major features of the system, including the terminal output for two illustrative problems. Finally, several observations are made about the use of interactive programs in accounting courses.

LEARNING OBJECTIVES OF THE SYSTEM

The overall objective of CAL is to improve the transfer of learning from the classroom to the practice of accounting. The problem is to provide a learning experience that will result in the attitudes, perspectives, and knowledge that will improve learning transfer.

The cognitive learning objective is to achieve the level of learning called "application," which is a more advanced form of learning than "comprehension."[3] One can comprehend an accounting method or procedure, as evidenced by test results, but not be able to use that method to solve a different type of problem that is structurally equivalent. Comprehension is necessary for learning transfer, but it does not ensure that transfer will take place.[4]

CAL facilitates the achievement of the application level of learning in two ways. First, the learning focus is on the generalized solution method which is implemented by the computerized algorithm, not on the computations needed to solve individual problems. The emphasis is on problem definition, formulation of the equations needed to implement the method, and interpretation of solutions; little time is required to perform computations. The solution method, not the computations, become the focus of learning. Second, a wide variety of problems from different accounting contexts are solved to emphasize the generality of the method. When the same solution method is applied to apparently unrelated accounting problems, the generality of that method becomes apparent to students. Further, the emphasis is on using the allocation method to solve practical problems, not just on learning the method.[5]

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[1] The classification of learning objectives into the cognitive, affective, and psychomotor domains is basic to learning theory. See Bloom *et al.* [1956] and Krathwohl *et al.* [1956].

[2] The use of interactive computing in the practice of accounting is becoming more commonplace than many academic accountants realize. See Fox [1975], Martin [1978], and Schenold [1978].

[3] For a comprehensive discussion of the hierarchy of learning, see Bloom [1956]. An excellent discussion of learning objectives and learning level outcomes in accounting can be found in Williams and Guy [1974].

[4] For a comprehensive discussion of learning transfer in accounting education, see Bentz [1975].

The affective learning objective is to develop positive attitude and experiences with an important tool of accounting. The need to integrate the use of computers into the undergraduate accounting curriculum has been recognized for some time. CAL provides precisely the form of integration envisioned by the 1968–1969 Committee on the Role of the Computer in Accounting Education [AAA, 1970, p. 34] and the Committee on Courses in Managerial Accounting [AAA, 1972, p. 6].

Time-sharing, as opposed to batch computing, has been used to implement CAL for both cognitive and affective learning reasons, some of which are based on the author's prior experience in academic computing. One reason is that an interactive program can make use of self-contained instructions which guide use of the program. Novice users are guided through the interaction sequence without having to read a user's manual. Second, input editing features of the program make it possible for users to correct data input errors as they occur, not hours or days later. This feature is very important in achieving correct results more rapidly than is typical using other computing methods. Third, the interactive nature of time-sharing provides instantaneous feedback to students. Problem formulation and other difficulties tend to become evident very quickly, and users are frequently able to correct their errors and move on to solve correctly new problems during a session with the system. Fourth, a number of assignments can be solved at one sitting of an hour or so. Thus, learning is more compressed than is typically possible.

MAJOR FEATURES OF THE SYSTEM

CAL consists of an interactive program, which is coded in BASIC, some instructions, and an integrated set of problem assignments. In this section, the program is described in terms of (1) the costing method on which the system is based, and (2) the interaction sequence between each student and the computer.

Allocation Method

CAL can be used to solve any costing or income allocation problem that can be represented by a system of homogeneous linear equations. For example, the problem of allocating costs among reciprocally related service departments requires the solution of a system of equations in order to develop unbiased estimates of the incremental cost of providing a service (see Kaplan [1973, pp. 738–48]). Similarly, a variety of other, more typical costing problems have been illustrated by Arnoff [1970, pp. 14–16], Gambling [1975], Frank [1974, pp. 371–6], Ijiri [1968, pp. 49–61], and Staubus [1971, pp. 104–123]. These illustrations provide ample evidence that linear models can be used productively to solve traditional costing problems. Selected portions of two of these illustrations are used to demonstrate the manner in which CAL can be used in a variety of problem contexts.

The first illustration concerns a textbook problem, the Prairie State Paper Company [Horngren, 1977, p. 546], which involves estimating the incremental cost of an activity that is reciprocally related to other activities [Kaplan, 1973, pp. 738–48]. In short, one requirement of the problem is to estimate the incremental cost of producing electricity for purposes of a "make-or-buy" decision.

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[5] A discussion of the effects on learning transfer of learning a generalized solution method and then practicing with it is contained in Bentz [1974].

The solution to this problem is complicated by the fact that electricity is used to pump water, some of which is used to generate the steam that is used, in part, to generate electricity.

If electricity is purchased from external suppliers as opposed to being generated internally, then the production activity levels of both the steam and the water plants can be reduced somewhat. The resulting cost savings must be added to the savings that can be expected from a stoppage of electrical generating activities.

The specifications in the problem indicate that "... 60 percent of the water is used for the production of steam and 40 percent is used in manufacturing. Half of the steam produced is used for the production of electric power and half for manufacturing. Twenty percent of the electric power is used by the water plant and 80 percent goes to manufacturing" [Horngren, 1977, p. 546].

Cost allocation problems of this type can be formulated as a single set of equations or they can be partitioned into two sets of equations that are solved in sequence (see Livingstone [1969, pp. 50–53]). Both procedures are outlined in Equations (1) to (5), and both are illustrated here.

In matrix notation, the one-phase form of the reciprocal cost allocation method is

$$\bar{x} = (I - C)^{-1}\bar{d} \qquad (1)$$

where $\bar{x}$ is an $n \times 1$ vector of gross activity costs, $\bar{d}$ is the $n \times 1$ vector of traceable activity cost, C is an $n \times n$ matrix in which c_{ij} is the proportion of the jth activity's output which is used by the ith activity.

The equivalent, partitioned form of this allocation method involves a two-phase solution process. The partitioning is

$$\bar{x} = \begin{bmatrix} \bar{x}_1 \\ \bar{x}_2 \end{bmatrix}, \; C = \begin{bmatrix} C_{11} & C_{12} \\ C_{21} & C_{22} \end{bmatrix}$$

and

$$\bar{d} = \begin{bmatrix} \bar{d}_1 \\ \bar{d}_2 \end{bmatrix} \qquad (2)$$

where the first k activities are reciprocally related but the remaining m activities $(n = k + m)$ are not reciprocally related, *i.e.*, a strict precedence ordering does exist for the final m activities when the best possible ordering of all n activities has been achieved.

The two-phase solution method involves the sequential solution of the two equations

$$\bar{x}_1 = (I - C_{11})^{-1}\bar{d}_1 \qquad (3)$$

and

$$\bar{x}_2 = \bar{d}_2 + C_{21}\bar{x}_1 \qquad (4)$$

or

$$\bar{x}_2 = \bar{d}_2 + C_{21}(I - C_{11})^{-1}\bar{d}_1. \qquad (5)$$

The vector $\bar{x}_1$, represents the gross cost of the k interrelated activities and the product $C_{21}\bar{x}_1$, represents the distribution of these costs among the m remaining activities. If the vector of traceable activity costs is a null vector, then $\bar{x}_2$is a vector of the amounts of cost allocated to each corresponding department.

In order to solve the problem, gross cost equations for the water (x_1), steam (x_2), and electricity (x_3) departments can be formulated as follows:

$$\begin{aligned} x_1 \qquad\qquad & -0.2x_3 = 2{,}000 \\ -0.6x_1 + \quad x_2 \qquad & \qquad = 18{,}000 \\ -0.5x_2 + & \quad x_3 = 6{,}000 \end{aligned} \qquad (6)$$

or in the matrix form as

$$(I - C_{11})\bar{x}_1 = \bar{d}_1$$

or

$$\bar{x}_1 = (I - C_{11})^{-1}\bar{d}_1 \qquad (7)$$

where

$$\bar{x}_1 = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}, \; C_{11} = \begin{bmatrix} 0 & 0 & 0.2 \\ 0.6 & 0 & 0 \\ 0 & 0.5 & 0 \end{bmatrix},$$

and

$$\bar{d}_1 = \begin{bmatrix} 2000 \\ 18000 \\ 6000 \end{bmatrix}.$$

Once a student has formulated the system of equations needed to solve this problem, the resulting coefficients (C_{11}) and constants ($\bar{d}_1$) are entered into CAL in response to instructions and questions printed at each interactive terminal. Then, Table I can be printed for each student. The solution vector $\bar{x}_1$ is printed in the form of the TOTAL COST-GROSS column of Table I. The incremental cost of operating the electrical generating facility is $15,600. In order to complete this problem assignment, the incremental cost of operating the electrical generating facility must be compared with the cost of purchasing electricity from external sources.

TABLE I

SUMMARY OF ACTIVITY COSTS*

No.	*Gross*	*Net*
1	$ 5,319.15	$ 5,000.00
2	21,191.49	19,920.00
3	16,595.74	15,600.00
Grand Totals	$43,106.38	$40,520.00

* Incremental cost estimation for the service departments of the Prairie State Paper Company.

A second issue concerns the allocation of full absorption costs to production or primary activities. Table II. is used to indicate the inter-activity allocation process among all four departments, the three service departments, and the one production department. Students are usually asked to select this output format for the allocation of service departments to production departments (see Equation 5). For more details concerning this illustration, the reader can consult Horngren [1972, pp. 262–64].

The important point of this exercise is that the student must solve a system of simultaneous linear equations in order to obtain an unbiased estimate of the incremental cost of operating the electrical department. CAL makes it easy to solve the problem without imposing an additional computational burden on the students. Further, students can modify the vector of direct departmental costs to determine the cost levels at which the decision would change.

The second illustration concerns the determination of account balances in a straightforward process costing problem, the Lano-Lov Lotion problem. This

TABLE II

Activity Number	*Total Cost*	*Total Allocated Cost**	*Cost Allocated from Activity Number*			
			1	*2*	*3*	*4*
1	$ 17,021.28	$ 7,021.28	$ 0.00	$ 0.00	$ 7,021.28	$0.00
2	40,212.76	10,212.76	10,212.76	0.00	0.00	0.00
3	35,106.39	20,106.39	0.00	20,106.39	0.00	0.00
4	55,000.00	55,000.00	6,808.51	20,106.38	28,085.11	0.00
Totals	$147,340.43	$92,340.43	$17,021.27	$40,212.77	$35,106.39	$0.00

* Allocation of both fixed and variable costs among all four departments of the Prairie State Paper Company.

AICPA examination problem has been used both in textbooks [Matz and Curry, 1972, pp. 523–3; Keller and Ferrara, 1966, p. 200] and in an illustration of potential applications of input-output models by Frank [1974, pp. 371–6]. The portion of the problem which concerns the costing of containers is used to demonstrate the range of problems that can be solved using CAL.

Let x_1 denote the number of cases (gross) of Lano-Lov Skin Lotion produced. A separate variable for the number of containers x_2, is established so that the cost of containers can be determined as a separate subtotal (see [Frank, 1974, p. 375]). The number of bottles (gross) to be used is denoted by x_3. The number of labels (thousands) to be used is denoted by x_4. The estimated loss rates are 2 percent and 3 percent for bottles and labels respectively.

Input-output equations for the container segment of the Lano-Lov problem can be written as

$$\begin{array}{llll} x_1 & & & = d_1 \\ -x_1 + & x_2 & & = d_2 \\ & -x_2 + 0.98x_3 & & = d_3 \\ & -0.144x_2 & +0.97x_4 & = d_4 \quad (8) \end{array}$$

where d_1 represents the net production of Lano-Lov (d_2, d_3, $d_4 = 0$ in this case).

The solution vector is given in the left-hand column of Table III for an assumed net output level of 800 gross. The second column represents the total net production of Lano-Lov available for both internal use and external use.

TABLE III

SUMMARY OF ACTIVITY COSTS*

No.	*Gross*	*Net*
1	$ 800.00	$ 800.00
2	800.00	800.00
3	816.33	800.00
4	118.76	115.20
Grand Totals	$2,535.09	$2,515.20

* Output requirements for the Lano-Lov Problem.

TABLE IV

SUMMARY OF ACTIVITY COSTS*

No.	*Gross*	*Net*
1	$4,881.71	$4,881.71
Grand Totals	$4,881.71	$4,881.71

* Total cost of producing 800 cases of Lano-Lov Lotion.

By letting C_{21} (see Equation 4) represent a row vector of acquisition costs, the cost of containers can be computed. The specific prices are $5.50 per gross of bottles and $3.30 per thousand labels. Thus, $C_{21} = (0 \;\; 0 \;\; 5.50 \;\; 3.30)$ and $\bar{x}_2 = \$4,881.71$ (see Table IV). Various cost subtotals, such as the cost of raw materials or the cost of direct labor, can be determined from the net utilization rates contained in $(I - C_{11})^{-1}$ and the per unit costs of the inputs. Frank (1974, p. 375) has demonstrated these computations for the Lano-Lov problem.

Although these two problems can only be outlined due to the space constraints, it should be evident that a variety of managerial costing problems can be solved by using one generalized costing procedure. Moreover, income allocation problems that arise when there are reciprocally owned accounting entities can be solved using this same procedure. Of course, not all costing problems can be characterized by the same linear structure.

Student-Computer Interaction Sequences

This section outlines the communication sequence between each student and the computer. The objective is to provide the reader with an overview of the learning process that can be experienced by each student. Only the one-phase allocation method, the method used to solve the Prairie State Problem, is described in detail here.

In response to computer-generated instructions, the user enters the size (n) and the elements of the allocation proportions matrix C. The matrices $(I-C)$ and $(I-C)^{-1}$ are printed out for the user to examine in order to facilitate an understanding of the matrix operations being performed by the computer. This step can be omitted for students who are well versed in matrix algebra.

Next, the vector $\bar{d}$ is entered in response to instructions to do so, and $\bar{x}$ is computed using equation (1). The results can be printed out in the form of either Table I or Table II. At this point in the program, the user is asked if he wishes to utilize phase two. The answer is "no" if the one-phase method is being used.

Next, the user is given the opportunity to revise either $\bar{d}$ or C. Any revisions are made first to $\bar{d}$ and then to C. These revisions can range from a change in one element of a matrix to the solution of a completely new problem.

In summary, the user enters the elements of C and $\bar{d}$, receives a solution in the format of either Table I, or Table II, and repeats the process for revised versions of $\bar{d}$ and C, respectively, when necessary.

Experience Using CAL

The author has been using a variety of interactive programs in managerial and managerial cost accounting courses for several years. As a result of these experiences, several observations can be made concerning the use of interactive programs that may be of interst to to potential users of CAL.

One issue concerns the impact on testing. As the learning emphasis shifts to problem formulation and the interpretation of solutions, testing must change accordingly. It has been found helpful to provide learning objectives and general study questions at the time computer-based assignments are made. These objectives and questions provide the guidance and the direction required by average students. Without this guidance, they tend to become anxious about the role of the computer exercises in the testing process. This is much less of a problem with the better students.

A second issue involves the initial encounter with a computer terminal. The biggest problem encountered is to get each student who has never used a terminal to use one for the first time. In order to overcome this problem, detailed sign-on instructions are provided to all students. Further, it is helpful to have someone available at the site of the terminals at scheduled times in order to facilitate the sign-on process. Once a student has used a terminal, there is no further problem; only the first session is a problem.

A third issue concerns what a student is asked to do during the first session at a terminal. It is very helpful to have students play a game or run a "terminal introduction" program. Most academic computing installations have such programs readily available. This approach is helpful because students are so anxious during their first computer session that learning how to use a terminal is quite enough for that session.

A fourth issue concerns differential student response. Some students will clearly benefit from and enjoy using systems such as CAL. Some will go through the motions with indifference. Still others will prefer to avoid computers at any cost. A differential response is to be expected because not everyone learns the same way.

A fifth issue concerns faculty-student

interaction. Experience indicates that more time should be allowed for office contacts with students when they are working on computer-based exercises. Typically, a number of students will work intently until the exercises are entirely complete. As a result, these students seem to develop a number of specific questions for which they want prompt resolution. Although the cause is unclear, it does appear that computer-based exercises generate more questions than traditional problem-solving methods. Perhaps it is because some closure can be achieved with respect to the working of a computer algorithm as opposed to *ad hoc* procedures that do not appear to be so well-defined.

In summary, experience suggests that different student responses can be expected to systems such as CAL. As an example, it seems that students need a lot of help during their initial encounter with a computer terminal. Some of them will tend to have a number of questions about computer-based exercises in an apparent effort to attain closure, while others will be indifferent to them. These problems can be mitigated, if not eliminated, by proper planning.

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National Automated Accounting Research System—A Challenge For Auditing Education

Jack L. Krogstad and Daniel S. Dexter

ABSTRACT: The National Automated Accounting Research System (NAARS) was developed through joint efforts of the AICPA and Mead Data Central, Inc. to provide accounting practitioners with computer-assisted capability for research of accounting and auditing problems. This paper describes the educational benefits, learning objectives, and instructional approach associated with providing auditing students at both the Bachelor's and Master's levels the opportunity to perform accounting and auditing research with NAARS.

Accounting practitioners frequently need to retrieve relevant information from published annual reports and from the voluminous technical materials available to the profession. The National Automated Accounting Research System (NAARS) was developed through the joint efforts of the AICPA and Mead Data Central, Inc. to meet this need by utilizing advanced computer technology for researching accounting and auditing problems.

NAARS is the accounting and auditing complement of the LEXIS data base, which contains legal and tax materials. Boley and Danos [1978] discuss pedagogical applications of LEXIS/NAARS in tax accounting and financial accounting classes. The LEXIS Federal Tax Library, for example, includes (1) the Internal Revenue Code, (2) regulations, (3) decisions of all courts which hear tax cases, (4) revenue rulings, revenue procedures and miscellaneous other items included in the *Cumulative Bulletin*, and (5) Public Laws and the related House, Senate, and Conference Committee Reports.

NAARS is a "full text" data base (*i.e.*, every word in a document is included) that is accessed by remote computer terminals. Each terminal is equipped with an input keyboard, high-speed display screen, and a printer. Any document in the data base can be retrieved, displayed, and printed by request of the NAARS user.

Practicing CPAs find NAARS useful in many ways [Leonhardi and Neumann, 1977; Gale, 1978]. These ways include:

1. Locating pertinent portions of authoritative pronouncements issued by the AICPA, APB, FASB, SEC, and CASB which relate to the accounting or auditing issues under consideration;
2. Locating examples of financial re-

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porting and disclosure alternatives from published annual reports; and

3. Locating examples of audit reports issued under various circumstances.

CPA firms presently have terminals in the following locations:

New York
Arthur Andersen
Arthur Young
Coopers & Lybrand
Deloitte, Haskins & Sells (2)
Hurdman and Cranstoun
Main Lafrentz
Oppenheim, Appel
Peat Marwick (2)
Price Waterhouse
S. D. Leidesdorf
Touche Ross

Los Angeles
Arthur Young
Kenneth Leventhal
Laventhol & Horwath
Peat Marwick

Chicago
Alexander Grant
Arthur Andersen
Arthur Young
Peat Marwick
Touche Ross

Detroit
Touche Ross

Washington, D.C.
Coopers & Lybrand
Ernst & Ernst
Peat Marwick
Touche Ross

Dallas
Peat Marwick

Houston
Arthur Andersen
Peat Marwick

San Francisco
Touche Ross

Silver Springs, Md.
Laventhol & Horwath

Philadelphia
Laventhol & Horwath

Atlanta
American Regional
Accounting Firms (ARAF)

Cleveland
Ernst & Ernst

CPAs of these firms in offices without terminals can utilize the NAARS data base merely by telephoning offices with terminals and initiating search requests. Further, it seems likely that service centers will be made available in the future to smaller firms on a subscription basis. The AICPA currently offers access to the system on a fee basis. Research inquiries may be directed to the AICPA's Information Retrieval Department.

EDUCATIONAL BENEFITS

Forward-looking professional accounting education should recognize the opportunity to serve both the accounting profession and accounting students by meeting the challenge of providing basic training in NAARS research. Of course, the ideal educational situation results when a business school or accounting department has its own LEXIS/NAARS terminal. However, the absence of such a terminal is insufficient reason for not exposing students to this very efficient research tool. Business schools or accounting departments that cannot justify the expense of having their own terminal have several options open to them. The literature now contains a few articles describing the LEXIS/NAARS system and its usefulness (see References at the end of this paper). These articles can be supplemented with (1) the *NAARS Primer* published by Mead Data Central, Inc., which covers the fundamental mechanics of NAARS research; (2) training films or video cassettes available from Mead Data Central, Inc. and the AICPA; (3) field trips to nearby CPA firms or law firms with terminals where usage of the system can be discussed and real searches observed, and (4) sharing the use of a terminal with a law school in the same university system. Over 75 law schools now have LEXIS, and the NAARS component can be added for a small surcharge ranging from $40 to $100 per month.

Incorporating NAARS research in auditing classes at both the Bachelor's (second auditing course) and Master's levels at The University of Texas at Austin has resulted in the following overall educational benefits for auditing students:

1. It has provided direct contact with approximately 4,000 annual reports and corresponding auditors' opinions coupled with a search technology capable both of discriminating specific items or types of information and of including all relevant documents.
2. It has provided a working knowledge of how relevant professional and regulatory pronouncements relate to disclosure or reporting issues and has facilitated development of professional judgment in the process of assimilating and integrating such pronouncements within the context of specific professional situations.
3. The structuring of research problems and search requests has sharpened professional vocabulary, issue perception, and general research skills, and has enhanced the ability to ask clear, concise, relevant questions in auditor-client and evidence-gathering situations (*i.e.*, the NAARS data base can be used as a proxy for sources of audit evidence).

LEARNING OBJECTIVES

The auditing student is encouraged to master the following learning objectives:

1. Be able to describe the contents of the NAARS library and how it is arranged by files and documents;
2. Be able to formulate efficient search requests, using words, phrases, numbers, and combinations of these;
3. Be able to use the NAARS data base to research technical and professional accounting and auditing problems; and
4. Be able to make informed professional judgments and defend proposed solutions to reporting problems.

NAARS LIBRARY

The NAARS Accounting Library is organized according to *files*. A file is a separately searchable entity which is comprised of a set of related documents.

1. Annual Report File—contains approximately 4,000 annual reports of corporations whose stock is traded on the New York and American Stock Exchanges and Over-the-Counter for the most recent two years. Preceding years are on archive tape. Only the financial statements, footnotes, and auditor's opinion from the annual reports are in the file; other materials in the annual report are included only if incorporated by reference.
2. Accounting Literature File—contains Statements on Auditing Standards; Industry Audit Guides; FASB Statements, Interpretations, and Responses to Requests for Action; APB Opinions, Statements, and Interpretations; Accounting Research Bulletins; Accounting Terminology Bulletins; Industry Accounting Guides; SEC Regulation S-X; SEC Accounting Series Releases and SEC Staff Accounting Bulletins; Cost Accounting Standards Board Statements; International Accounting Standards Committee Pronouncements; and Accounting Standards Executive Committee Position Papers.
3. Management Discussion and Analysis File—contains approximately 500 management discussions and analyses of the summary of operations extracted from annual reports covering a wide variety of industries.

4. Prospectus File—contains approximately 75 prospectuses on archive tape of corporations filing with the SEC and offering common stock for sale to the public.
5. Technical Practice Aids—contains inquiries to the AICPA's technical information service and its replies.

SEARCH REQUESTS

The NAARS search technique requires the formation of key words, phrases, numbers, and combinations of these. The technique rests upon the assumption that certain key words that are relevant to the subject matter being researched appear in some specifiable relationship within the text of the documents being searched. The researcher has direct access to original data and develops an index to this data via key word(s) selection.

Mechanics of search construction and terminal operation are simple. Reasonable proficiency normally is attainable in three or four hours of study and terminal operation. No computer programming knowledge is needed. The researcher communicates directly with the system in ordinary English with a typewriter-style keyboard, and the interactive dialogue provides guidance through each step of the research process. Students are referred to Mead Data Central's *NAARS Primer* and *Desk Book* for discussion of search strategies and specific construction techniques. These sources emphasize that effective research involves thinking out and carefully constructing the search request and its alternatives *before* accessing the NAARS data base.

ACCOUNTING AND AUDITING PROBLEMS AND PROFESSIONAL JUDGMENTS

The usefulness of NAARS depends on the user's ability to research *significant* and *complex* technical and professional problems. This requires the articulation of a technical vocabulary and professional competence with a NAARS research capability. Students are confronted with a series of contemporary technical and professional issues through case situations drawn from auditing practice. Development of professional judgment occurs throughout the research process as well as in arriving at a proposed solution.[1]

First, cases are analyzed in order to identify the central issues, select relevant files, and express search requests. A search thus begins with at least a tentative judgment concerning these matters. Within seconds the computer responds with the number of documents that meet the search criteria. The student then must decide whether to modify the search so as to expand or narrow the number of potentially useful documents. Next, the student reviews applicable portions of retrieved documents, one by one, making an evaluation of the relevance and validity of the information obtained. Finally, after weighing alternative solutions, corresponding support, and applicable technical and professional pronouncements, the student reaches a conclusion which he or she must be able to defend to other class members and the instructor.

Ensuing class discussions of proposed solutions are particularly beneficial to students because of the flexibility of NAARS research. NAARS research encourages student creativity while at the same time permitting the integration of professional and technical standards and personal ideals with pragmatic considerations of real audit situations. The idealistic nature of students tends to elevate acceptable solutions to well above minimum compliance. The whole process leads the student toward personal involvement and professional identity.

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[1] Mautz and Sharaf [1961, p. 103] list five steps in judgment formation in auditing; (1) recognition of the proposition to be proved, (2) evaluation of the proposition as one requiring evidence of a high or moderate degree of probability, (3) collection of evidence within the given limits of time and cost, (4) evaluation of the evidence obtained as valid or not valid, and (5) formulation of judgment as to the proposition at issue.

STUDENT REACTIONS

NAARS research has been taught as a three-week module in both undergraduate advanced auditing courses and a Master's level auditing course. Student reaction to NAARS exposure is overwhelmingly positive. Student comments repeatedly reflect a new awareness of professional identity. For example, one student commented, "The NAARS system, coupled with the use of case exercises, allows the student to place himself in the shoes of an actual auditor when confronted with a difficult professional problem. The student, through working the cases, gains some idea of how the different sources of information may be applied. To have some knowledge of what sources of information are available to an accountant when confronted with a problem is invaluable to an auditing student. NAARS makes this educational experience feasible in a relatively short period of time."

Another student emphasized the insight gained into the process of judgment formation, "NAARS research develops in the student the capability for defining a problem, for determining the relevant issues and the appropriate sources of data, for evaluating the information obtained, and for forming a judgment about the solution."

Other benefits mentioned by students were an improved ability to ask the "right" questions, an opportunity to view the vast range of research material available to auditors in the context of real situations, an appreciation of the wide range of possibilities for resolving an issue, a broadened view of the audit function and its relationship to other fields in the real world, and a general refinement in research skills.

CONCLUSION

NAARS research capability is a valuable tool in the hands of an auditor. Increasing use of this tool is inevitable. Progressive auditing education should provide students with at least an awareness of NAARS computer technology and its usefulness in researching accounting and auditing problems. NAARS operational proficiency is even more desirable. Applying NAARS skills in actual audit case situations promotes a broad range of professional development in auditing students. Learning objectives specified in this paper are within the resource constraints and delivery capability of many accounting programs. Less ambitious objectives can be pursued by schools not having access to NAARS terminals through readings, training films, video cassettes, and field trips to CPA firms or law firms with NAARS terminals.

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A Report and Analysis of the Accountancy Faculty Recruiting Surveys of 1975–1978

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ABSTRACT: In May of 1975, 1976, 1977, and 1978 a faculty-recruiting questionnaire was mailed to accounting program administrators of schools holding membership in the American Assembly of Collegiate Schools of Business. The purpose of the study was to determine the supply of, and demand for, accounting faculty along with other pertinent information concerning the recruitment of new faculty. A discussion of the 1978 findings along with an analysis of the four-year trend are presented. Ample evidence of a faculty shortage is provided. There is an insufficient number of professional teachers to meet classroom staffing needs. This, in turn, may be a threat to the quality of accounting education. Exhibits are in comparative form for the four years and show details of the salaries offered new assistant professors, the availability of summer teaching and summer research, and the types of courses and number of course hours taught by the new assistant professors. The four-year trend displayed in the exhibits is briefly discussed.

As in the three preceding years, the 1978 Accountancy Faculty Recruiting Survey questionnaire was mailed to respondents in May. The 1977–78 membership roster of the American Assembly of Collegiate Schools of Business was used as the population base for the survey. Community colleges were not represented. The data collection period was from May through June, 1978.

Questionnaires were mailed to 516 institutions in the United States, Puerto Rico, the Virgin Islands, and Canada. Responses were received from 283 schools, or 54.8 percent of the population base. Of the replies received, 47.5 percent came from AACSB-accredited schools. In terms of type of institution, 67.2 percent were public and 32.8 percent were private.

While reference is made to the findings of the 1975, 1976, and 1977 surveys, it should be noted that data for the four years are not necessarily fully comparable. The number of schools surveyed and responses received both have increased over the four-year period (Exhibit 1). Further, because the responses have been on a non-identification basis, we have no way of knowing to what extent the respondents to the survey are the same.

RESULTS OF SURVEY

Relative to faculty vacancies, the 1978 survey showed 450 unfilled positions in the population of 281 schools (two questionnaires not completed) or a mean of 1.6 vacancies per department. Extrapo-

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Exhibit 1

Data on Departments Answering Questionnaire

	1978			*1977*		*1976*		*1975*	
	No.	*%*	*Population Base*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Total Surveyed	516	100.0*		512	100.0	497	100.0	464	100.0
Total Responses	283	54.8	516	305	59.6	293	59.0	247	53.7
AACSB-Accredited	133	47.5	280	141	46.5	129	44.0	105	42.5
Private	90	32.8	274	103	33.9	95	34.2	78	31.6
Public	184	67.2	274	201	66.1	185	65.8	169	68.4

* Of the domestic educational institutions (July 1977) 60 percent are public, 40 percent, private; 38 percent are accredited.

lating the 450 vacancies based on the 54.8 percent response, one could estimate that there may have been over 820 vacant positions in the total population. A similar extrapolation for 1977 indicated that there might have been over 790 unfilled positions. Both figures should probably be reduced to eliminate any sample bias arising from the fact that a greater proportion of schools with unfilled positions may have returned questionnaires. On the other hand, if one were to include all of the institutions in the United States offering an accounting program in which the student's major field of concentration is accounting, there might well be about 700 schools rather than the 516 surveyed [Williams, 1974]. Further, no consideration has been given to the faculty needs of community colleges.

Looking to the future, the problem of unfilled faculty positions is compounded by departmental plans to expand faculties and by losses of faculty because of individuals leaving teaching. The estimated number of new positions for 1979–80 totaled 396; the number of people estimated to be leaving teaching amounted to 208. Accordingly, it would appear that there will be 1,054 positions to be filled for the 1979–80 academic year in the 281 reporting departments (Exhibit 2). The outlook for a potential supply to fill these vacancies is bleak.

Exhibit 2

Faculty Vacancies and Potential New Faculty Supply for the Year 1979–80[a]

VACANCIES:	
Positions Vacant 1978–79	450
Estimated New Positions 1979–80	396
Estimated Number of Persons Leaving Teaching 1979–80	208
TOTAL ESTIMATED VACANCIES 1979–80	1,054
POTENTIAL SUPPLY:	
New Doctorates	116
ABD's Entering Market	50
TOTAL POTENTIAL SUPPLY 1979–80	166[b]
INDICATED UNFILLED POSITIONS 1979–80	888

[a] Based upon responses from 281 Departments.

[b] Based upon responses from 52 of 69 doctoral programs [Crum, 1978]

Responses were received from 52 of the 69 doctoral programs [Crum, 1978]. The respondents estimated that 116 candidates would complete their doctorates during 1978–79. Further, they estimated that 50 ABDs would enter the teaching field in 1979–80. Accordingly, there is an indicated inflow of 166 potential candidates to fill the 1,054 positions, leaving 888 unfilled positions for 1979–80 in the 281 reporting departments.

The mean salaries paid to new hires by type of degree were as follows: Doctorate, 1978-$20,681, 1977-$19,135, 1976-$18,090, 1975-$17,421; ABDs 1978-$19,522, 1977-$18,122, 1976-$17,102, 1975-$16,408. The mode for the Doctorate in the 1978 survey was $21,000 compared to $19,500 in 1977. Several departments reported that they had paid in excess of $23,000 to new hires.

Summer teaching was either guaranteed or made available to new assistant professors by 72.9 percent of the responding institutions. Research funds were either guaranteed or made available by 29.5 percent of the schools reporting.

A breakdown of the types of courses taught by new assistant professors shows that 38.3 percent were assigned undergraduate courses only, while 59.6 percent were assigned a mixture of undergraduate and graduate courses, and 2.2 percent were assigned graduate courses only. The latter category very probably represents institutions that offer accounting only at the graduate level. There has been little change in the type of teaching assignments given to new assistant professors between the 1975 and 1978 surveys.

Of the 268 schools responding to the questions on course load, 64 were on the quarter system and 219 were on the semester system. For purposes of this report, quarter hours were converted to semester hours. The responses to the questions on course loads revealed the following information: 58.6 percent of the respondents had annual course loads of 18 or fewer hours; 39.5 percent had course loads ranging from 19 to 24 hours; and 1.9 percent had course loads in excess of 24 hours.

The following responses were received relative to equal opportunity activities. Interviews and employment of women: 169 departments reported 304 interviews, and 73 departments hired 81 women. Interviews and employment of minorities: 90 departments reported 157 interviews, and 22 departments hired 26 candidates. The number of women and minority candidates hired in 1978 was considerably larger than in 1977 (Exhibit 3). As expected, most institutions pursued various sources of leads for new hires. However, a tabulation of the responses indicated that most new hires came through personal contact with graduate schools. The other two predominant methods of obtaining new hires were circularizing graduate schools and interviewing candidates at the AAA annual meeting (Exhibit 4).

FOUR-YEAR TREND ANALYSIS

Because of the excellent cooperation of department administrators, the information in the exhibits appears to be representative of the populations and indicative of conditions existing around the nation. This information is of importance to accountants in practice, industry, and government as well as to academicians. The four-year comparison not only tends to produce a trend, but also acts as a reinforcement for the results of any one year.

As indicated in Exhibit 1, the response rate of 53.7 percent (247) in 1975 in-

EXHIBIT 4

SOURCES OF LEADS FOR NEW HIRES

Number of Departments[a]			
1977[b]	*1976*	*1975*	*Source*
126	129	149	Personal contact with graduate schools
62	65	82	Circularizing graduate schools
59	64	57	AAA annual meeting
28	31	31	AAA regional meetings
34	27	32	Advertisements in THE ACCOUNTING REVIEW
63	44	34	Other Advertisements
45	47	52	Other

[a] Most schools marked more than one category.

[b] This information was not obtained in 1978.

EXHIBIT 3

EQUAL OPPORTUNITY ACTIVITIES

Women Interviewed		*None*	*1*	*2*	*3*	*4*	*5 or more*
Number of Departments	1978	110	86	26	29	11	7
	1977	164	56	45	27	7	6
	1976	158	71	33	21	6	4
	1975	136	60	35	11	2	3
Women Hired[a]		*None*	*1*	*2*	*3*	*4*	*5 or more*
Number of Departments	1978	207	65	8	0	0	0
	1977	265	31	9	0	0	0
	1976	246	37	7	3	0	0
	1975	209	31	6	1	0	0
Minorities Interviewed		*None*	*1*	*2*	*3*	*4*	*5 or more*
Number of Departments	1978	190	54	18	9	5	4
	1977	236	47	15	5	2	0
	1976	222	44	17	6	1	3
	1975	182	39	12	7	6	1
Minorities Hired[b]		*None*	*1*	*2*	*3*	*4*	*5 or more*
Number Departments	1978	258	18	4	0	0	0
	1977	289	15	1	0	0	0
	1976	267	20	5	0	1	0
	1975	228	16	3	0	0	0

[a] Hired 1978—81; 1977—49; 1976—60; 1975—46.

[b] Hired 1978—26; 1977—17; 1976—34; 1975—22.

creased to 59.0 percent (293) in 1976, 59.6 percent (305) in 1977, and declined to 54.8 percent (283) in 1978. The percent of the accredited schools answering has increased—42.5 percent, 44.0 percent, 46.5 percent, and 47.5 percent. Answers from departments in private schools have remained fairly steady at approximately 33 percent. (Of the domestic educational member institutions, 40 percent are private.)

Exhibit 5 shows the demand for, and supply of, accounting faculty from responding departments for the four academic years ended 1979–80. The 1975 survey revealed 292 positions vacant in

EXHIBIT 5

FACULTY VACANCIES AND POTENTIAL NEW FACULTY SUPPLY FOR THE YEAR 1979–80 WITH COMPARATIVE FIGURES FOR 1976–77, 1977–78, AND 1978–79[a]

Survey Year	*1978*	*1977*	*1976*	*1975*
Vacancies:[a]				
Positions Vacant				
1978–79	450			
1977–78		476		
1976–77			450	
1975–76				292
Estimated New Positions				
1979–80	396			
1978–79		382		
1977–78			388	
1976–77				402
Estimated Number of Persons Leaving Teaching				
1979–80	208			
1978–79		187		
1977–78			188	
1976–77				148
Total Estimated Vacancies	1,054	1,045	1,026	842
Potential Supply:[b]				
New Doctorates	116	139	133	101
ABD's Entering Market	50	45	66	45
Total Potential Supply	166	184	199	146
Indicated Unfilled Positions for 1979–80, 78–79, 77–78, 76–77	888	861	827	696

[a] Based upon total responses—1978, 281; 1977, 305; 1976, 293; 1975, 247.

[b] Based upon responses from doctoral programs—1978, 52; 1977, 58; 1976, 54; 1975, 54.
Total doctoral programs in U.S. 1975–78, 63–69 [Crum, 1978].

the 247 schools responding, while the 1976, 1977, and 1978 surveys indicated 450, 476, and 450 vacancies in 293, 305, and 281 schools, respectively. The number of respondents has decreased by 24; the number of vacancies reported has decreased by 26. Many of the departments reported the issuance of one-year contracts to fill some of the budgeted positions. Exhibit 6 shows the absolute number of vacancies in each department. Note that in 1975 approximately 11 percent of the departments had more than two vacancies, in 1976 and 1977 16 percent, and in 1978 approximately 20 percent had more than two vacancies. Equally noteworthy is the fact that in 1975 49 percent reported no vacancies but only 37 percent reported no vacancies in 1976, 41 percent in 1977, and 42 percent in 1978. The mean number of vacancies per department has increased from 1.1 in 1975 to 1.6 in 1978.

New faculty positions and positions vacated by persons leaving teaching add to the demand for new faculty for 1979–80. New positions declined during the first three years from 402 to 382 even

EXHIBIT 6

DISTRIBUTION OF FACULTY VACANCIES—1975–78

Actual Number of Vacancies[a]		*None*	*1*	*2*	*3*	*4*	*5*	*6–14*	*19–23*	*Total*
Number of Departments	1978	119	56	47	25	13	3	17	0	280
	1977	124	77	53	18	8	6	15	2	303
	1976	107	90	47	18	10	1	20	0	293
	1975	122	59	38	11	5	6	6	0	247

[a] Mean ($\bar{M}$) 1978 = 1.6 vacancies per department. Total vacancies 450.
Mean ($\bar{M}$) 1977 = 1.6 vacancies per department. Total vacancies 476.
Mean ($\bar{M}$) 1976 = 1.5 vacancies per department. Total vacancies 450.
Mean ($\bar{M}$) 1975 = 1.1 vacancies per department. Total vacancies 292.

EXHIBIT 7

DISTRIBUTION OF NEW POSITIONS AND PERSONS LEAVING TEACHING
FOR 1979–80, 1978–79, 1977–78, 1976–77

		Number of Positions per Department								
		Total	*None*	*1*	*2*	*3*	*4*	*5*	*6*	*7 or more*
New Positions	1979–80	396	72	97	73	22	9	3	2	3
	1978–79	382	84	123	61	21	8	2	3	2
	1977–78	388	82	109	67	16	10	4	1	4
	1976–77	402	58	105	44	20	5	3	6	6
Positions from Persons Leaving Teaching	1979–80	208	143	88	37	7	5	1	0	0
	1978–79	187	180	76	37	11	1	0	0	0
	1977–78	188	171	75	35	7	3	2	0	0
	1976–77	148	144	72	23	4	2	2	0	0

though the number of respondents increased by 58, but estimated new positions increased to 396 for 1979–80 even though the number of respondents decreased by 24. Positions created by persons leaving have increased from 148 to 208 however, the apparent upward trend may be misleading since there are 34 more respondents (Exhibit 7).

While there are a number of possible reasons for the gap between supply and demand for accounting faculty, no discussion on this subject will be presented. However, three areas of interest to those seeking positions are shown in Exhibits 8 through 12. The salaries paid to new hires by type of degree are cited above and shown in Exhibit 8. The upward trend, as noted above, is evident. The mean wage paid to new doctorates was

EXHIBIT 8

DISTRIBUTION OF WAGES OFFERED TO NEW ASSISTANT PROFESSORS—1978 SURVEY

Wages Offered (9 mo. basis)	*under 16,000*	*16,001 to 17,000*	*17,001 to 18,000*	*18,001 to 19,000*	*19,001 to 20,000*	*20,001 to 21,000*	*21,001 to 22,000*	*22,001 to 23,000*	*over 23,000*
Doctorate $\bar{M}=20{,}681$	4 2%	6 3%	11 5.7%	13 6.7%	24 12.2%	60 30.6%	51 26%	20 10.3%	7 3.5%
ABD $\bar{M}=19{,}522$	8 5.1%	8 5.1%	22 14%	27 17.1%	32 20.2%	38 24%	16 10.1%	6 3.8%	1 0.6%
Masters/CPA $\bar{M}=17{,}043$	51 40.2%	34 26.7%	23 18.1%	10 7.8%	4 3.2%	2 1.6%	2 1.6%	1 0.8%	0 0%
Masters $\bar{M}=16{,}523$	47 71.2%	8 12.1%	5 7.6%	3 4.6%	2 3%	0 0%	1 1.5%	0 0%	0 0%

DISTRIBUTION OF WAGES OFFERED TO NEW ASSISTANT PROFESSORS—1977 SURVEY

Wages Offered (9 mo. basis)	*under 16,000*	*16,001 to 17,000*	*17,001 to 18,000*	*18,001 to 19,000*	*19,001 to 20,000*	*20,001 to 21,000*	*21,001 to 22,000*	*22,001 to 23,000*	*over 23,000*
Doctorate $\bar{M}=19.135$	15 7.2%	10 4.8%	18 8.7%	52 25.1%	77 37.2%	16 7.7%	15 7.2%	4 1.9%	0 0%
ABD $\bar{M}=18{,}122$	23 13.8%	23 13.8%	27 16.2%	53 31.8%	33 19.8%	6 3.6%	2 1.2%	0 0%	0 0%
Masters/CPA $\bar{M}=16{,}066$	86 63.3%	32 23.5%	12 8.8%	4 3%	1 0.7%	0 0%	0 0%	1 0.7%	0 0%
Masters $\bar{M}=15{,}326$	65 94.1%	2 2.9%	1 1.4%	0 0%	1 1.4%	0 0%	0 0%	0 0%	0 0%

DISTRIBUTION OF WAGES OFFERED TO NEW ASSISTANT PROFESSORS—1976 SURVEY

Wages Offered (9 mo. basis)	*under 16,000*	*16,001 to 17,000*	*17,001 to 18,000*	*18,001 to 19,000*	*19,001 to 20,000*	*20,001 to 21,000*	*21,001 to 22,000*	*22,001 to 23,000*	*over 23,000*
Doctorate $\bar{M}=18{,}090$	26 12.9%	20 9.9%	51 25.3%	76 37.7%	16 7.9%	7 3.5%	2 1%	4 2%	0 0%
ABD $\bar{M}=17{,}102$	45 30.6%	30 20.4%	37 25.2%	27 18.3%	6 4.1%	2 1.4%	0 0%	0 0%	0 0%
Masters/CPA $\bar{M}=15{,}672$	105 78.4%	19 14.2%	9 6.7%	0 0%	1 0.7%	0 0%	0 0%	0 0%	0 0%
Masters $\bar{M}=15{,}200$	69 92%	5 6.6%	0 0%	0 0%	1 1.3%	0 0%	0 0%	0 0%	0 0%

1975: $\bar{M}=17{,}421$, Doctorate; 16,408, ABD; 15, 568, Masters/CPA; 15,044, Masters.

$17,412 in 1975; the 1976 mean of $18,090 was approximately 4 percent higher, that for 1977 of $19,135 was almost 6 percent higher than the 1976 mean, and the 1978 mean of $20,673, 8 percent higher than that for 1977. In each

Exhibit 9

Summer Teaching Guaranteed or Available to New Assistant Professors

	1978			*1977*			*1976*		
Departments	*No*	*Yes*	*Total*	*No*	*Yes*	*Total*	*No*	*Yes*	*Total*
Actual #	75	202	277	83	211	294	95	193	288
Percent	27.1	72.9	100	28.2	71.8	100	33	67	100

Exhibit 10

Summer Research Guaranteed or Available to New Assistant Professors

	1978			*1977*			*1976*		
Departments	*No*	*Yes*	*Total*	*No*	*Yes*	*Total*	*No*	*Yes*	*Total*
Actual #	194	81	275	212	78	290	213	71	284
Percent	70.5	29.5	100	73.1	26.9	100	75	25	100

Exhibit 11

Types of Courses Taught by New Assistant Professors

	Undergraduate Only		*Undergraduate and Graduate*		*Graduate Only*		*Total*	
Departments	#	%	#	%	#	%	#	%
1978	106	38.3	165	59.6	6	2.2	277	100
1977	120	40.5	168	56.8	8	2.7	296	100
1976	123	42.5	158	54.7	8	2.8	289	100
1975	127	51.4	114	46.2	6	2.4	247	100

year, the mean salary of the ABDs was approximately $1,000 less than that paid to those with the doctorate.

The 1975 survey asked if summer teaching and research was guaranteed to new assistant professors. The questions were changed for 1976 and 1977 to read "guaranteed or available." The availability of summer teaching rose from 67 percent of the responding departments in 1976 to 71.8 percent in 1977 to 72.9 percent in 1978; the availability of research rose from 25 percent to 26.9 percent to 29.5 percent (Exhibits 9 and 10).

A trend may be observed in the type of teaching assignments given to new assistant professors. The percentage of departments assigning a combination of graduate and undergraduate courses has changed from 46.2 percent to 59.6 percent over the four-year period (Exhibit 11). In addition, the trend towards the teaching of fewer course hours is evident. In 1975, 49.1 percent of the departments assigned 18 or fewer hours to the new assistant professors while 54.2 percent, 58.0 percent, and 58.6 percent of the departments reported 18 or fewer course hours taught in 1976, 1977, and 1978, respectively (Exhibit 12).

EXHIBIT 12

COURSE HOURS TAUGHT PER ACADEMIC YEAR BY NEW ASSISTANT PROFESSORS—1976–77*

Semester Hours per Academic Year	*Less than 12*	*12–15*	*16–18*	*19–21*	*22–24*	*More than 24*	*Total*
# of Departments—1978	27	63	67	17	89	5	268
Percent	10.1	23.5	25	6.3	33.2	1.9	100
# of Departments—1977	32	77	61	23	95	5	293
Percent	10.9	26.3	20.8	7.8	32.4	1.7	100
# of Departments—1976	31	69	54	27	96	7	284
Percent	10.9	24.3	19.0	9.5	33.8	2.5	100

*1975**

Semester Hours per Academic Year	*Less than 12*	*12–16*	*18*	*20–22*	*24*	*More than 24*	*Total*
Number of Departments	21	26	38	8	78	2	173
Percent	12.1	15.0	22.0	4.6	45.1	1.2	100

* Includes quarter hours converted to semester hours.

CONCLUSION

The results of the surveys relative to the availability of new faculty concur with Crum's findings [1978] and provide ample evidence of the problem facing the academic and practicing accounting profession. There is a lack of professional teachers to meet classroom staffing needs. This may be a threat to the quality of accounting graduates.

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FINANCIAL REPORTING

Lee J. Seidler, Editor

The Value Added Statement in Britain

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ABSTRACT: A new form of accounting statement, the Value Added (VA) Statement, now appears in the annual reports of many major British companies. One quarter of such companies now present a VA Statement, and the British government has announced that it intends to make this compulsory. This article relates the structure of the VA Statement to the underlying theory of company team membership, and the Statement is contrasted with the earnings statement which it resembles. The advantages and disadvantages of including a VA Statement in annual reports are discussed. The alleged advantages are difficult to verify but on balance the VA Statement is concluded to be a useful newcomer to the annual report provided it can be standardized. Recommendations on an accounting standard are given, including the conclusion that VA should be calculated after deducting depreciation.

SINCE 1975, a new form of accounting statement has been appearing in the corporate reports of some of the larger British companies. It is the Value Added (*VA*) Statement. Already approximately one quarter of the 100 largest companies are voluntarily including a VA Statement in their annual reports, and this proportion is still growing. Further growth seems inevitable, as the government has indicated that it intends to make all substantial British companies include a VA Statement in their annual reports [Department of Trade, 1977].

This development of the VA Statement is especially interesting, as it represents a new direction in which financial reporting, in theory and practice, can go. The main thrust of financial accounting development in recent decades has been in the area of *how* we measure income, especially in the face of changing prices. The question of *whose income we measure* has been largely ignored, though Hendriksen's text [1977] is an exception. We accountants ignore the question because we are aware of only one answer. When asked, "whose income?," many accountants reply that net income or profit is the reward of the proprietors, *i.e.*, the shareholders in the case of a company. Proponents of Value Added reply that there are advantages in defining "income"

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in such a way as to include the rewards of a much wider group than just the shareholders. One can include shareholders and all suppliers of long- and short-term loan capital, together with employees and the government. The "income" of this team is called Value Added, and equals net profit with tax, interest, and wages costs all added back.

The structure of double-entry means that there is another way of arriving at Value Added, which is by deducting from sales revenue the cost of all materials and services which were bought-in from outside suppliers. This will give the same figure for VA, because the reward of our wider team must equal gross team revenues (*i.e.*, sales) less amounts payable to persons outside the team (*i.e.*, bought-in costs). The relationship between VA and profit can be expressed algebraically. We start by defining the retained profit for a given fiscal year as what is left after all costs, dividends, and taxes have been deducted from sales revenue, thus:

$$R = S - B - Dep - W - I - Div - T \qquad (1)$$

where R is retained profit, S is sales revenue, B is the total of bought-in materials and services, Dep is the annual depreciation charge, W is the year's wage cost, I is the interest payable for the year, Div is the total of dividends payable for the year, and T represents corporate taxes.

Re-arranging (1) we have:

$$S - B - Dep = W + I + Div + T + R \qquad (2)$$

Each side of Equation (2) equals Value Added. As will be seen, there is controversy in theory and divergent practice regarding depreciation in VA Statements, so we call the above *Net* VA, to make clear that it refers to VA after deducting depreciation.

Many accountants would prefer to rearrange Equation (1) thus:

$$S - B = W + I + Div + T + Dep + R \qquad (3)$$

Each side of Equation (3) then equals *Gross* Value Added, or Value Added before deducting depreciation.

Equations (2) and (3) follow the format of VA Statements prepared in practice. The left-hand side of each equation relates to the upper part of the VA Statement, where bought-in costs are deducted from sales revenue. Having arrived at the figure for the year's VA, the lower part of the VA Statement shows its division among team members, which is symbolically represented in the right-hand sides of Equations (2) and (3).

Table 1 shows the Value Added Statement included in the annual report of

TABLE 1

BOC INTERNATIONAL LTD. AND SUBSIDIARIES VALUE ADDED STATEMENT YEAR TO SEPTEMBER 30, 1977

	£ million
Sales	670.6
Less	
Bought in materials, services and depreciation	411.1
Value added	259.5
Add	
Investment income	4.2
Available for application	263.7
Applied as follows:	
To employees as pay and Group companies' contributions to pensions and state welfare schemes	180.8
To banks and other lenders as interest	19.6
To government as taxes on profits	25.6
To partners in companies not wholly owned by Group	3.6
To shareholders of BOC International	9.3
	238.9
Profits retained by ourselves and our partners for expansion	24.8
	263.7

BOC International Ltd., (formerly British Oxygen) for 1977. BOC has chosen the Net VA form of presentation rather than Gross VA, and so its VA Statement illustrates Equation (2). It can be seen how the company deducts bought-in costs and depreciation from sales to arrive at VA for the year of £ 259.5 million. The investment income is then added (a complication which has been ignored in Equation 2), and the total available for sharing among team members is £ 263.7 million. The division of this among the various sub-groups in the team then follows. The heading "to partners in companies not wholly owned by the group" refers to dividends payable by BOC subsidiaries to minority shareholders in subsidiaries not wholly owned by the group. The amounts payable to each, team member sum to £238.9 million, leaving £24.8 million as the group's retentions.

It is interesting to consider why so many British companies are, like BOC, deciding to present a VA report. Although the VA Statement is a very recent development, the concept of VA is considerably older. It originated in the U.S. Treasury in the eighteenth century [Cox, 1978], and periodically accountants have discussed whether the concept should be incorporated into financial accounting practice (see Suojanen [1954], for example). However, the VA Statement has taken root only in Britain,[1] and that very recently, and two immediate factors can be suggested as causes. First, Britain introduced a Value Added Tax (VAT) in April, 1973. The administration of this point-of-sale tax does not require production of a VA Statement, and the Statement cannot be used for tax verification due to complicated rules on goods and services which are exempted or zero-rated. However, the tax has led to increased awareness in the business world of the meaning of VA. Second, the British Accounting Standards Committee, sponsored by the principal U.K. and Irish accounting bodies, published *The Corporate Report* [ASC, 1975], a discussion paper on the purposes of annual reports, and in it the authors suggested that such reports should include a VA Statement.

It is worth mentioning that a frequent synonym for VA is "wealth creation," and this may have encouraged many industrialists to link VA reports on wealth creation with remedial action to halt Britain's relative industrial decline.

ADVANTAGES

The advantages claimed for the VA Statement are considerable. First, it is said that it improves the attitudes of employees toward their employing companies. This effect is alleged to occur because the VA Statement reflects a broader view of the company's objectives and responsibilities. Few workers are said to be enthusiastic about maximizing profit, which is somebody else's reward, and, therefore, a profit statement has little interest or motivational value for employees. However, a company's VA represents the wealth creation available for the company team, in which employees are seen as responsible participants. When fully informed about VA, they should be better motivated to work, be more cooperative and more identified with their company. This hoped-for behavioral change links with ideas on industrial democracy which are popular in some British political circles. (See, for example, the Bullock Report [1977].) Many companies include VA reports in their employee newspapers or other vehicles of communication with their staff, and so the inclusion of a VA Statement in the annual report is said to add credibility to the use of VA elsewhere.

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[1] A few companies in the Netherlands include VA information in their annual reports, but the disclosures often fall short of being a full VA Statement, and the method of arriving at VA is grossly non-standardized. The annual reports of the Dutch companies Akzo N.V., Internatio-Müller, N.V., and SHV Holding N.V. are especially interesting, giving an idea of the variety of VA reporting practice.

This type of behavioral hypothesis is notoriously difficult to test, as it depends on the sincerity of management, who might merely be producing a VA Statement to follow the herd, with no intention of evolving a more "team-centered" approach to the work force.

A second advantage claimed for the VA Statement is that it makes it easier for the company to introduce a productivity bonus scheme for employees based on VA. A number of British companies, of which Imperial Chemical Industries Ltd. is the best known, have introduced such schemes to enhance productivity. The employees receive bonus payments and/or shares in the company according to a formula based on demonstrated improvements over time in the VA/payroll ratio. If a company wishes to install such a scheme, or wishes to keep open its options to do so, then including a VA Statement in its annual report will be advantageous because it will spread knowledge of and trust in VA. Suspicion of VA should be lessened if VA is reported to shareholders in the annual report as well as forming the basis for productivity schemes.

TABLE 2
ALCAN ALUMINIUM (U.K.) LTD. AND SUBSIDIARIES
VALUE ADDED INFORMATION YEAR TO
DECEMBER 31, 1976*

	Current Cost *£ millions*	*Historic Cost* *£ millions*
Sales	227.3	227.3
Less bought-in costs	175.1	162.0
Gross Value Added	52.2	65.3
Depreciation	17.3	6.7
Net Value Added	34.9	58.6
Payroll costs	38.7	38.7
Payroll/VA ratio	110%	66%

* Extracted from p. 15 of Annual Report, December 31, 1976.

A third advantage claimed is that VA-based ratios (like the VA/payroll ratio mentioned above) are a useful diagnostic and predictive tool. In many British companies, employees receive 70 percent or thereabouts of VA. Trends in this ratio, comparisons with other companies, and international comparisons may all be useful. This is especially so if the ratio is based on inflation-adjusted VA data. To date, three British companies have presented VA Statements adjusted for inflation: one (Colt International Ltd.) used the single-index, or current purchasing power method, while two (Alcan Aluminium (U.K.) Ltd. and Bowater Corporation Ltd.) used the replacement cost or current cost method. The figures produced by Alcan were especially interesting. Table 2 shows how the payroll costs absorbed 66 percent of VA when measured according to historical cost conventions. However, when the costs of bought-in materials and services and also depreciation were adjusted to current costs, the ratio rose to 110 percent. Naturally, no business could long sustain a figure of over 100 percent for long. The jump from 66 percent to 110 percent is unusually large, but one can see how this ratio draws attention to trends in labor costs and may be helpful in wage bargaining as a means of informing labor representatives. For example, the relationship between this ratio and the level of retained profit (hence investment and longer-term job security) is made clear in the VA Statement.

Another VA-based ratio which is popular is that of taxation to VA. The difficulty with this ratio is that there is a great lack of standardization in the classification of taxes in VA Statements. The recent annual reports of Esso Petroleum Company Ltd. illustrate this. In the 1976 annual report, the company's VA was £ 729 million, and central and local government took 74 percent of this in taxes. In the 1977 annual report, VA was down to £ 301 million, and the government took only 23 percent. This drastic change is surprising, until one reads the detail and sees that the company has changed its accounting policy for treating excise duty and Value Added Tax. In 1976, these were included in VA and in the government's share, but in 1977 they were excluded from both. In brief, Esso has partly fallen into line with prevailing practice in Britain, for most companies report only corporation tax under the government's share. Esso still shows taxes paid to local government and royalties paid to governments under the government's share, neither of which practices is widespread.

Provided taxes are classified consistently and uniformly, this ratio and trends therein are useful for inter-industry and international comparisons.

One other popular ratio is VA/Sales, which measures the degree of vertical integration of a group of companies, and also can be interpreted as an index of vulnerability to disruptive action affecting supplies of materials and services.

Before leaving the topic of VA-based ratios, it is worth mentioning how relevant they are to the testing of rival theories of Britain's relative industrial decline since the end of World War II. Such theories abound, and the VA Statement throws light on most of them. Is the root cause of the problem a disinclination to hard work? The ratios of VA per employee and VA to wages cost are relevant, especially when international comparisons are made. Has the government over-taxed British industry? Ratios of taxes to VA would throw light on this, especially if the ratios for different industries were compared with their growth rates. Is under-investment to blame, or insufficient research and development? Again, the proportions of VA being allocated to these activities will help assess the rival hypotheses.

A fourth advantage of the new Statement is that VA provides a very good measure of the size and importance of a company. To use sales figures as a basis for company rankings can cause distortion, because sales may be inflated by large bought-in expenses which are passed straight on to customers. Capital employed, which is also sometimes used for rankings, can likewise be misleading. For example, a capital-intensive company with few employees may appear to be more important than a labor-intensive company. In a key industry. VA does not have these disadvantages and is, therefore, superior to sales and to capital employed as a ranking basis.

A fifth advantage of the VA Statement is that it links a company's financial accounts to national income. With a number of qualifications, which will be listed later, it is true that a company's VA indicates the company's contribution to national income. Furthermore, the sum of the Values Added by each company will equal national income. VA reports, therefore, start off with an inheritance of credibility, for most users of accounting statements have at least a broad comprehension of, and trust in national income figures. Hence VA, by providing a link between financial statements and the economists' macroeconomic data, will assist the inter-professional exchanges of data and expertise. For example, the VA Statement is closely related to the economists' input/output analysis of inter-industry relationships. The Statement should, therefore, increase the possibility of companies using input/output methods to improve their internal decision making. Also there are possibilities for the national income data to be verified and eventually, perhaps, derived from the underlying VA Statements of individual companies, thereby enhancing the accuracy of macroeconomic statistics. This would improve economic forecasts and hence make possible the more timely and accurate use of the instruments of economic policy.

The principal qualifications to the general rule that the sum of the Values Added by all companies equals the economist's national income figure are:

1. National income includes Value Added by government and by other public bodies. For example, the Value Added by defense expenditure is assumed to be equal to its cost.
2. The VA of a company may arise partly in foreign territories. Similarly, Value may be Added in the domestic country by a foreign concern.
3. Economic measures of national income concentrate on production rather than on sales. Differences arise, therefore, in the valuation of increases/decreases in inventories.
4. National income conventions involve several major simplifying assumptions which are not used by financial accountants. For example, the output of durable consumer goods is assumed to have been consumed in the year of manufacture. In effect, the economist depreciates a car by 100 percent in the first year, while the accountant would write off his company's fleet of vehicles at, say, 25 percent of cost in each year.

A final advantage claimed for the VA Statement is that it is built on the basic conceptual foundations which are currently accepted in balance sheets and earnings statements. Concepts such as going concern, matching, consistency, objectivity, and substance-over-form are all just as applicable to the VA Statement as to the earnings statement. Also, the alternative theories of income measurement (based on historical cost, replacement cost, realizable values, deprival values, *etc.*) can all be translated into terms of VA measurement. This point may be expressed in a different form by saying that the VA Statement is identical with a conventional earnings statement except for the matter of whose earnings are included: "earnings" refers to the return accruing to shareholders while VA refers to the return accruing to the whole team of providers of labor and of capital, plus the government.

Having reviewed the advantages which are claimed for the VA Statement, it is natural to consider whether there are any disadvantages in its inclusion in annual reports.

DISADVANTAGES

The first disadvantage of the new Statement is that it implicitly treats a company as a team of cooperating groups, and this attitude may be grossly at variance with the facts. VA is said to be the reward which is earned by the joint and interdependent efforts of employees (who provide labor services), shareholders and lenders (who provide capital), and the government (which provides law and order, defense services, infrastructure, a legal framework for contract-enforcement, *etc.*) It is the government which is the least natural member of the alleged team. The government was not invited to join the team, it plays no part in team decision making, and its share of VA (*i.e.*, corporation tax) is proportional to profits rather than to VA. Another case where team membership seems to be strangely defined is where a supplier of bought-in materials is a specialist supplier to a sole customer. This supplier would be excluded from the team even though he had no other outlet for his production. We have already mentioned the British company BOC, which has a near-monopoly of the supply of industrial gases. Suppose BOC bought all its steel gas cylinders from XYZ Ltd., which makes no other product and has no other market for its cylinders. Under the VA conventions, XYZ would be *excluded* from the BOC team even though its entire commercial future were tied up with BOC. However, a bank which extended temporary credit to BOC would be *included* in the BOC team (as a capital provider) even though it was not committed to or knowledgeable about the industrial gas industry. Common sense here would suggest the exact opposite, *i.e.*, that XYZ Ltd. was part of the team while the bank was not.

The best that can be said to defend the VA Statement from this attack is that for most companies there is already some validity in drawing a line around workers, capital-providers, and government and declaring those included to be a team. And indeed the objection discussed has a certain circularity, for one of the advantages claimed for the VA Statement is that it will lead team-members to regard themselves as part of a team. In short the objector is saying, "I do not find your team-definition to be natural," while the VA proponent is replying, "You will find it natural when all companies adopt it and, moreover, the definition suggested will improve teamwork."

A second disadvantage of the VA Statement is that its inclusion in an annual report can cause confusion with the earnings statement. What would a non-accountant reading the annual report infer if he saw that VA was rising while earnings were falling? Or, indeed, what would he make of the annual report if he saw VA was positive but earnings were negative? This last case would not be all that unusual and can be illustrated by a simple example. Suppose a company's sales for the year were £100, bought-in costs were nil, and it paid £150 in wages. In these circumstances VA for the year would be £100, for that would be the Value placed on the company's efforts by its customers. However, a loss of £50 has been made. What has happened here is that the team has earned £100 of VA but has overdistributed to team members. In effect, shareholders have lost £50 of the company's reserves, as this is the excess of wages over VA. The shareholders can rightly say they have lost Value to the extent of £50, but the VA Statement is not a report on shareholders' welfare. It is a report on the welfare of a more broadly defined team, and that team taken as a whole has benefited by Value Added of £100.

A third disadvantage of the VA Statement is that it raises a new danger of inefficient management, since managers may wrongly seek to maximize their company's VA. One book has already been published which exhorts managers to accept this improper objective [Gilchrist, 1971]. This unsound advice could lead to grossly wasteful decisions in which shareholders' capital would be dissipated in subsidizing uneconomic output. Consider, for example, a company which currently buys a component from a supplier for £100. A manager investigates the possibilities of making the component within the company and finds that to do so would cost £80 in direct materials and £70 in direct labor (overheads are assumed to be nil for simplicity). The foolish VA-maximizer would now decide on internal manufacture, as his bought-in costs would then fall from £100 to £80 and so the VA would rise by £20 for each component. However, this £20 of additional VA would involve an extra £70 of wages, and so shareholders' earnings would fall by £50 per component. The VA-maximizer would, therefore, be dissipating shareholders' capital by manufacturing instead of buying in.

A fourth argument against the VA Statement is that its inclusion in the annual report would involve extra work, therefore extra costs and delay and also a slight loss of confidentiality in view of the additional disclosure involved. In practice the extra work, cost, and delay have proved to be negligible. The only extra disclosure involved for British companies has been their overseas wage cost. This arises because current disclosure requirements cover *U.K.* wage costs, and, therefore, the inclusion of *total* wage cost in the VA Statement implicitly reveals overseas wages. This could be an embarrassing or damaging disclosure if all overseas wage costs arose in one country, *e.g.*, because of considerations of competitiveness with overseas rivals or political sensitivity as in southern Africa.

The final objection to the VA Statement is a very serious one: VA Statements are flagrantly unstandardized. Indeed, an unscrupulous accountant could manipulate the choice of methods of VA calculation to produce almost any VA figure desired. To illustrate the variety and massive effect of VA reporting practices, one can refer back to the accounts of Esso already mentioned. Another example comes from the 1975 and 1976 annual reports of Allied Breweries Ltd. In the former year Allied's VA was £ 379 million and the government's share was 50 percent. In the latter year VA was £ 247 million and the government took only 13 percent. Had the beer drinkers *and* the government both become abstemious? In fact, the company had merely decided to re-classify the special excise tax on alcohol as a bought-in cost rather than as part of the government's share of VA.

All the companies mentioned in this article have made clear how they have arrived at the figures used in their VA Statements and so no readers of the Statements should have been misled. However, it is clear that the VA Statement will not long retain the public's confidence unless it is standardized. The Accounting Standards Committee is already studying the questions of classification and definition in the VA Statement. Depreciation and taxes are the main problems.

It has already been seen that a VA Statement can be framed as a report on Net VA, after deducting depreciation, and Table 1 which showed the Net VA of BOC illustrated this. However, the majority of British companies prefer to set forth their VA Statement as a report on Gross VA, so that depreciation is an application of VA rather than a cost to be deducted in calculating VA. Table 3 shows an example of a report on Gross VA, that of Imperial Chemical Industries Ltd. The VA Statement of ICI shows how depreciation can be added to the retained profit for the year, thereby giving a total which ICI has described as "re-investment in the business." The Gross VA for the year was £ 1,874 million, and the depreciation charge was £ 221 million. Had ICI chosen to present a report on Net VA, its VA would have been £ 1,653 million (*i.e.*, £ 1,874 million less £ 221 million). In this case, the choice of Gross or Net VA makes a difference of 13 percent of the Net VA. One can see how the treatment of depreciation has a material effect, especially on the ratios

TABLE 3

IMPERIAL CHEMICAL INDUSTRIES LTD., AND SUBSIDIARIES
VALUE ADDED STATEMENT YEAR TO DECEMBER 31, 1977

Sources of income		*£ million*
Sales		4,663
Royalties and other trading income		39
Less: Materials and services used		(2,866)
Value added by manufacturing and trading		1,836
Share of profits of principal associated companies and investment income		96
Exchange loss on net current assets of overseas subsidiaries		(29)
Extraordinary items		(29)
Total value added		1,874
Disposal of total value added		
Employees		
—pay, plus pension and national insurance contributions	1,063	
—profit-sharing bonus	29	1,092
Governments—corporate taxes, less grants		202
Providers of capital		
—interest paid on borrowings	107	
—dividends to shareholders	93	
—minority shareholders in subsidiaries	26	226
Re-investment in the business		
—depreciation set aside	221	
—profit retained	133	354
		1,874

referred to earlier. For example, the reported share of VA going in wages will be higher if we adopt the Net VA definition than if we decide in favor of Gross VA.

The reasons for reporting Gross VA are three. First, Gross VA is a more objective figure than Net VA. This is because depreciation is more prone to subjective judgment than are bought-in costs. Depreciation involves opinions as to likely asset lives, scrap values, straight-line versus percentage of declining balance, and so on. Bought-in costs will involve some subjectivity, for example, regarding closing stock values, but the general run of bought-in costs such as repairs, fuel, telephone costs, and electric power, will be fairly objective. This point has special force if VA is to be used as a basis for some sort of productivity bonus to employees. Workers may suspect the management of manipulating VA to produce lower bonuses if a subjective cost like depreciation is deducted in arriving at VA.

Second, the Gross VA format involves reporting depreciation alongside retained profit. The resultant subtotal usefully shows the portion of the year's VA which has become available for re-investment. This ratio is less readily calculable from a Net VA Statement where depreciation is separated from retentions.

Third, the practice of reporting Gross VA would lead to a closer correspondence between VA and national income figures, for economists generally prefer gross measures of national income to net ones.

The present writer sees some merit in these arguments but believes that the principal reason why most British companies have reported Gross VA is that they have unthinkingly followed the advice given in *The Corporate Report* [ASC, 1975]. That document did not even mention the possibility of the alternative Net VA format. The following reasons for preferring Net VA are substantial and, in the present writer's opinion, outweigh the earlier points.

ARGUMENTS FOR NET VA

First, it has been explained how "wealth creation" is often used as a synonym for VA. Wealth creation is overstated if no allowance is made for the wearing out or loss of value of fixed assets which occurs as new assets are created. Another way of putting this is to say that a company theoretically could distribute 100 percent of its *Net* VA in the form of wages, taxes, interest, and dividends. But it could not long continue to distribute 100 percent of *Gross* VA, since the company would be consuming its seed corn, and its operations would grind to a halt when the fixed assets were exhausted. If, therefore, Net VA is distributable while Gross VA is not, then Net VA is a better denominator for distribution ratios such as payroll/VA.

Second, Net VA is a fairer base for calculating productivity bonuses than is Gross VA. Several British companies have introduced schemes which pay productivity bonuses based on achieved increases in VA. If these schemes are based on Gross VA, then they make no allowance for capital changes. A company's VA might rise after new capital had been invested in a major plant modernization, and employees might be given "their share" of this increase as a bonus. But if that share is based on VA before depreciation, then no recognition is given to the need for an increased depreciation charge. In short, the wrong people benefit, since the providers of capital deserve the credit for the VA increase. Net VA does not entirely do away with this unfairness, but it lessens it.

Third, the concepts of consistency and matching demand that depreciation be deducted along with bought-in costs to derive Net VA. Bought-in materials are assets bought from outside suppliers, and the cost thereof is matched against sales revenue in the upper part of the VA Statement. Depreciable fixed assets will also have been bought from outside suppliers,[2] and the cost of these should, therefore, also be matched against sales revenue over the assets' useful lives. Net VA treats materials and fixed assets consistently, as both will appear as deductions from VA in accordance with their becoming used up. Gross VA is inconsistent, for costs would be charged under the bought-in heading if the item has a life of under one year. But if the item has a longer life it would be treated as a depreciable fixed asset and its cost would *never* appear as a charge against VA.

Fourth, Net VA involves no double-counting, while Gross VA does involve some double-counting and is misleading. The double counting arises from the non-deduction of depreciation. Where one company buys a product from another company, the seller's VA will be augmented and the buyer's diminished by the amount of the sale. This elimination of the intermediate transaction reflects the idea that national income arises when a final consumer buys the product but no national income arises merely from inter-company transactions. If company A sells £100 worth of fuel to company B, then no Value is Added, or no wealth is created just by this transaction. The VA will arise when B uses the fuel to generate saleable output which will end up as a consumer product. If B did not deduct the £100 as bought-in cost, then the £100 of VA would be double-counted by A and by B. The VA Statement deals with these transactions satisfactorily so far as materials are concerned. But if the asset which A sold to B had been a depreciable fixed asset, then (a) Net VA would eliminate the double-counting as B would, over the years, deduct the £100 in the form of depreciation alongside other bought-in costs, while (b) Gross VA would not eliminate the double-counting.

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[2] Some fixed assets may have been made by the company, as where a building contractor builds his own offices. In these cases, the capitalized value of the home-built fixed asset should be added to sales in the VA Statement, the costs (bought-in material, labor, *etc.*) being reported elsewhere. In subsequent years the depreciation on the home-built fixed assets should be merged with depreciation on all other fixed assets in the VA Statement.

Fifth, the team concept behind VA fits Net VA better than Gross VA. If one looks at the Net VA Statement in Table 1, one sees that the team consists of workers, government, and capital providers. The surplus VA which remains after the share-out among team members is retained, and this retained profit is a deferred application of VA to shareholders, who are team members, and may thereby benefit by higher quoted share values and eventually higher dividends. The team concept works. However, if one looks at a Gross VA Statement, as in Table 3, one may justifiably ask how depreciation relates to the team concept. One of the ways in which VA has been "disposed" in Table 3 is "depreciation set aside." But depreciation is not an employee, or a capital provider, or the government. In fact the disposal reported as depreciation is a part of wealth which was in the past "distributed" or paid to the company which originally supplied the depreciable fixed asset. In short, suppliers of fixed assets are honorary team-members. This distorts the concept of the company team and introduces inconsistency between classes of supplier.

Accordingly the present writer considers that the VA Statement should be standardized as a report on *Net* VA.

TAXATION

The second major area of non-standardization in current VA practice is taxation. Some companies report only tax levied on profits (which in Britain is corporation tax) under the heading of "VA applied to governments." Other companies report an extensive range of taxes, including withholding taxes deducted at the source from workers' wages, local government charges for sanitation and roads, and taxes levied on the company's outputs. The two examples already referred to (Esso and Allied Breweries) show how large an effect the choice of accounting treatment can have, but these examples are abnormal as they come from industries which attract especially high rates of excise tax (petroleum and alcohol).

Most companies have chosen to include only corporation tax under the government's share of VA. This practice has many advantages. It avoids the need to make subjective judgments as to where to draw the line, for there is a long list of government imposts which could be regarded as part of the government's share. Examples of difficult items include road vehicle taxes, oil royalties, training levies to government-run training schemes for employees, and fines paid. Further, subjectivity arises over how widely "government" is defined—one could include government-sponsored bodies which regulate aviation and broadcasting, or utilities. Related to this danger of a subjective decision on which taxes to include is the simplicity and cheapness of the alternative. Taxes can be left in the accounts into which they have already been analyzed, and the VA Statement will then not require costly additional analysis work. This point is especially applicable where a group of companies with many subsidiaries, some overseas, is preparing a VA Statement. A further advantage of the suggested practice is that the VA Statement is easy to reconcile with the earnings statement if only corporate taxes on profit are included under the government's share of VA. This ease of reconciliation is lost if a wide range of taxes is included.

There are a number of additional minor areas of non-standardization in

VA Statements. These include the classification of rents payable (under bought-in costs or under interest payable?) and the way in which the results of associated companies are handled (see Morley [1978]). But it is broadly true that the Accounting Standards Committee could achieve substantial standardization of the VA Statement, thereby defusing the main argument against the Statement, if it prescribed (a) that depreciation should be deducted with bought-in costs, thereby reporting Net VA, and (b) that the government's share of VA should contain only corporation tax.

CONCLUSION

In many ways, the VA Statement is an unsatisfactory innovation to encounter. It is easy enough to understand and to prepare. Much is claimed for it, but the claims are hard to pin down and to verify. The benefits claimed are principally improvement in attitude, motivation, and behavior, and these are remarkably difficult to research. The present status of the VA Statement is that it has achieved sudden popularity in Britain and will probably soon appear in the corporate reports of all major British companies. It is likely that the dangers inherent in the wide selection of accounting treatments will lead the Accounting Standards Committee to issue a standard definition for each major heading in the VA Statement. Standard-setting committees have in the past often operated by discovering the most widespread practice, pronouncing it good, and making it compulsory. This will work well enough for the VA Statement except for the question of depreciation, where, for the reasons given earlier, the prevailing practice should be changed.

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Comments

Expectancy Theory in a Budgetary Setting: A Comment

Jesse F. Dillard and James Jiambalvo

In his recent article, Rockness [1977] attempts to develop an extended expectancy model of motivation and test the descriptive validity of the model in a budgetary setting. While a formal model of motivation provides a potentially useful framework for the author's empirical analysis, the study contains several theoretical and methodological weaknesses which severely limit its usefulness, especially as a basis for future research. The purpose of this comment is to examine critically (1) the formulation of the expectancy model of motivation, (2) the derivation of hypotheses from the model, and (3) the experimental design used to analyze the hypotheses.

EXPECTANCY MODEL OF MOTIVATION

One shortcoming of the author's study is the lack of correspondence between the formal model (Equation 2, p. 894) and the author's discussion of the model. He states (p. 894) that an important feature of the model is that it allows for alternative work effort levels. Furthermore, the model supposedly implies that "... an individual may select from alternative effort levels so as to maximize expected value, that is, force" (p. 895). However, as the reader may verify, his model does not contain alternative effort levels. His force value (F_i) is computed with respect to a work outcome, not an effort level.

The incongruity apparently arises because Rockness discusses a *behavioral choice model*, while he has developed a *job effort model* [Mitchell, 1974]. A behavioral choice model suggests that individuals select the effort level with the highest force or expected value from alternative effort levels (*e.g.*, high effort, medium effort, or low effort). A job effort model does not specify that alternative effort levels be selected in accordance with some maximization rule. It simply states that job effort is a monotonic function of expectancy model variables.[1]

A model consistent with Rockness' discussion would appear as follows:

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[1] The particular variables included in the model vary from author to author. Studies by Campbell *et al.* [1970], Galbraith and Cummings [1967], House [1971], and Turney [1974] provide examples of the types of variables included in expectancy models.

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$$F_i = \sum_{j=1}^{n} \text{IV effort}_{ij} + P_{1ik}\left(\sum_{l=1}^{n} \text{IV outcome}_{kl} + \sum_{m=1}^{n} P_{2km} EV_{km}\right) \quad (1)$$

Where

F_i = force toward effort level i.

IV effort$_{ij}$ = intrinsic reward j following directly from effort level i.

P_{1ik} = the expectancy that effort level i will lead to performance outcome k.

IV outcome$_{kl}$ = intrinsic reward l following directly from achieving performance outcome k.

P_{2km} = the expectancy that performance outcome k will lead to extrinsic reward EV_m.

EV_{km} = extrinsic reward m which is dependent on achieving a particular performance outcome k.

In other words, the force toward a given effort level is determined by the intrinsic reward following directly from the effort level, the perceived probability that the effort level will lead to a given performance level, and the expected rewards resulting from the performance level.

Consider an example where there are two effort levels (one high, one low), two intrinsic rewards associated with each effort level, two performance levels, two intrinsic rewards associated with each performance level, and two extrinsic rewards associated with each performance level. In accordance with Equation 1, above, an individual selects either a high level of effort or a low level of effort, depending upon which yields the higher calculated force value. If the individual selects a high level of effort, then his performance (which is a function of effort and ability) should be higher than if he selects a low level of effort.[2]

RESEARCH HYPOTHESES AND MODEL VALIDITY

The fact that the expectancy model developed by Rockness is at odds with his discussion does not imply that the model is invalid. The model may still provide a useful framework for analyzing the behavioral consequences of budgets. Therefore, testing the descriptive validity of the model remains a worthwhile endeavor. Unfortunately, as Rockness implies (p. 903), the validity of the complete model cannot be established in the context of this study. This immediately follows from the fact that two of the model variables, the intrinsic value of effort (IVeffort) and the intrinsic value of performance outcomes (IVoutcome), are never measured or systematically manipulated. Therefore, no research hypotheses are formulated which relate these variables to effort or performance.

A more serious failing of the study is that two of the author's hypotheses which are developed to test the model's descriptive validity simply do not follow from the model. Hypothesis 2 (p. 898) suggests that absolute performance will increase as budget difficultly increases. Budget difficulty is represented in the model by variable P_1, which is the expectancy that effort leads to a performance outcome. As budget difficulty increases, P_1 decreases from .50 to .33. Given Rockness' model, F_i must be lower in the high budget case and, therefore, performance should be lower.

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[2] Note the distinction between force and effort. Force is a propensity or inclination toward an effort level. Rockness uses these terms in a loose manner by substituting force for effort in his footnote 3, while earlier equating force with expected value.

This conclusion is consistent with the author's model and numerous other expectancy theory studies (*e.g.*, Lawler and Porter [1967], Galbraith and Cummings [1967, and Mitchell and Nebeker [1973]), but it suggests results which are exactly opposite the author's hypothesis. This is not to say that the author's hypothesis is not appealing. Goal theory [Locke, 1975] predicts that more difficult goals may result in higher performance than goals which are readily attained. However, given the stated objective of testing the validity of an expectancy model, the hypothesis is improperly specified, and its empirical verification cannot be interpreted as supporting an expectancy model.

Hypothesis 5 (p. 899) suggests that job satisfaction will decrease as budget difficulty increases. Rockness relates this hypothesis to his model indirectly by referencing Vroom's [1964] satisfaction model. In that study Vroom presented two models, one for predicting job satisfaction and the other for predicting force toward job effort [Mitchell, 1974]. However, Vroom's satisfaction model contains no variable corresponding to budget difficulty (P_1). Variables which measure the expectancy that effort leads to a performance outcome (P_1) are included only in Vroom's effort model. Rockness makes no further attempt to establish a theoretical link between P_1 and satisfaction. Therefore, verification of this hypothesis cannot be interpreted as supporting an expectancy model.

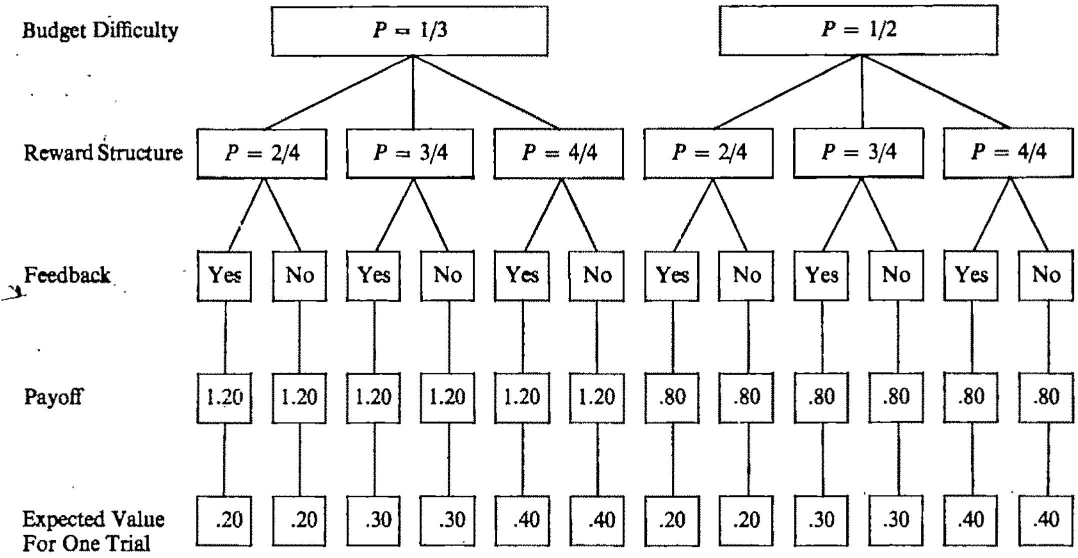
EXPERIMENTAL DESIGN

The most critical problem with this study is its experimental design. Rockness describes his experimental design as a standard $2\times2\times3$ ANOVA fixed effects design. This includes two levels of budget difficulty, two levels of feedback, and three levels of reward structure. The term reward structure refers only to the probability of obtaining a reward given successful performance. It does not relate to the amount of reward or payoff received by a subject. Rewards or payoffs differed according to the classification of subjects. High budget subjects were paid \$1.20 per paid run while medium budget subjects received \$.80 per paid run. Figure 1 illustrates the combination of treatments and the expected value of each treatment condition.

According to the article, subjects knew that they would be paid for successful performance. What is not stated explicitly is whether the subjects were told *how much* they would be paid. However, we may infer from the article that the subjects did know how much they would be paid. This follows from Rockness' discussion of satisfaction. He states (p. 900), "Since expected value of monetary rewards were the same for both the high and medium budget conditions, the expectation was that the net rewards after allowing for incremental cost of effort in the high budget condition would be lower than in the medium budget condition." The only way the expected value could be relevant to his discussion of satisfaction would be if the subjects knew the amount they would be paid for successful performance. Assuming the subjects knew the amount, the experiment is definitely not a standard $2\times2\times3$ design. Rather, it is a hierarchical design with the amount of reward or payoff being *nested* within budget difficulty.

FIGURE 1

COMBINATION OF TREATMENTS AND EXPECTED VALUES



This point is more than a statistical nicety affecting only the degrees of freedom and the level of significance of the author's tests. It also affects the *a priori* expectation of experimental results. Put aside momentarily our earlier criticism of the hypothesis that subjects in the high budget condition will have higher performance than subjects in the medium budget condition. Instead, examine the experiment and ask, "What difference in behavior would be predicted by the expectancy model?" As illustrated in Figure 1, the expected values for a high budget are equal to the expected values for a medium budget. This results from the nesting of payoffs within the two budget conditions. Since Rockness' expectancy model suggests that effort corresponds to expected value, the model would predict equal amounts of effort for individuals in the high and medium budget conditions. A significant main effect due to budget difficulty cannot be interpreted as supporting the model since, in the context of this design, the model does not predict a significant main effect.

SUMMARY

This comment has pointed out differences between Rockness' model and his discussion of the model. We reformulated his model to account for alternative effort levels and pointed out the difference between behavioral choice models and job effort models. We hope future reseach efforts will be attentive to the nuances of the expectancy theory literature. We also indicated that two hypotheses, developed to test the descriptive validity of the model, do not follow from the model or from previous research in expectancy theory. In combination with the experimental design problems, this fact severely limits any conclusions regarding the model's descriptive validity.

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Expectancy Theory in a Budgetary Setting: A Reply

Howard Rockness

THE comment by Dillard and Jiambalvo [1979] raises three issues, including (1) the specification of the expectancy theory model, (2) the hypothesis tested, and (3) the experimental design. I will deal with each in turn.

THE MODEL

Dillard and Jiambalvo cite Mitchell [1974] in support of a strong conceptual distinction between *behavioral choice models* and *job effort models*. In fact, Mitchell identifies the job effort as simply the most frequently tested form of the behavioral choice model where the choice is the level of effort. As noted in my original paper, formulations and tests of the job effort model (including that of Ronen and Livingstone [1975]) typically ignored "alternative work effort levels and multiple associated intrinsic and extrinsic rewards" [Rockness, 1977, p. 894]. Thus, my paper was directed at presenting and testing a more complete *job effort model* consistent with Vroom's (1964) behavioral choice model.

Having said that, it is worth examining the difference between the model I posed (Equation 2, p. 894) and that of Dillard and Jiambalvo. They have subscripted IV effort and *P* to identify each with a particular effort level *i*. I would suggest that it would be more consistent with my discussion to drop the subscript on *F* since the discussion clearly implies that *F* is defined for each potential effort level.

Nonetheless, the authors have suggested the need for clarification, and I agree.

RESEARCH HYPOTHESES

Two of the *experimental* hypotheses are argued to be inconsistent with the model. The first of these was that "performance would increase as budget difficulty increased." The second was that "satisfaction would decrease as budget difficulty increased." Both of these hypotheses relate specifically to the experimental conditions. The constrained environment of the laboratory offered rewards for successfully meeting a performance criterion. Conditions were manipulated to make expected value constant between budget conditions. Reduction in probability of meeting the budget was offset by increases in amount of payment for successful performance (see Rockness [1977], Table 1, p. 898). The choice for subjects was to attempt to meet at least the *given* budget or, alternatively, some other performance level for which no rewards were offered. The hypothesis was that an effort level necessary to meet the budget would be chosen as long as the expected value of offered monetary rewards was greater than the cost of the effort required to meet the budget.

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Note that the valid comparison is between F for effort levels required to meet or exceed the budget *vis-à-vis* all Fs reflecting lower-than-budget performance, rather than the comparison between F for the high-budget case *vis-à-vis* F for effort in the medium-budget case, as suggested by Dillard and Jiambalvo. Since expected values of monetary rewards were constant between budget levels, the expected value (F) would be lower in the high-budget condition when including the cost of effort, since the high-budget condition required more effort in order to meet it. If true, it was expected that performance would rise with imposition of a higher budget level (hypothesis 2) but the perceived total expected value of participation (both monetary and intrinsic) would decrease with satisfaction falling accordingly (hypothesis 2).

EXPERIMENTAL DESIGN

The discussion in Dillard and Jiambalvo on experimental design is in substance further comment on my hypothesis 2. The authors argue that the expected value of monetary rewards is the only variable affecting effort. They argue further that because the expected value of monetary rewards was equal between budget conditions, no difference in performance should be expected between budget levels. This argument ignores the intrinsic value of effort in the model and the fact that the experimental conditions in which the choice faced by subjects was not budget level but whether to choose an effort level sufficient to earn the reward. As before, performance was expected to be higher in the high-budget condition, because a higher level of effort was required to earn a monetary reward. Examination of Dillard and Jiambalvo's Figure 1 confirms that nesting occurs only if subjects are reacting to the amount of the payment rather than the expected value in each cell. Neither the model nor the experimental results support this interpretation.

CONCLUSION

Dillard and Jiambalvo have provided a useful clarification of my symbolic representation of the model. However, their discussion of the research design and experimental hypotheses fails to apply the model correctly and ignores the discussion and development of the experimental design in my original article. I welcome their discussion to the extent it resulted from lack of clarity or exposition on my part.

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A Macro-Case Analysis Approach to Tax Research—A Comment

Jerome S. Horvitz and D. R. Finley

PROFESSOR Misiewicz [1977] has introduced a macro-case methodology for tax research in facilitating tax compliance and planning.[1] He concludes that the macro-case method limits uncertainty in reducing tax problems and in predicting success of litigation. The purpose of this note is to challenge the validity of this technique and to illustrate that the mere listing of cases according to identifiable criteria may not only be a more cumbersome research methodology but may be misleading.

SAMPLING VARIATIONS

The basis of Misiewicz's approach is to tabulate identifiable criteria from legal cases that decide a particular issue. He uses the education expense deduction as an example and he lists twenty decisions that have either allowed or disallowed the expense. He concludes that [Misiewicz, 1977, p. 937], "the deduction will only be allowed if four criteria are met: (1) the expense must not be personal (Section 262); (2) the expense must be ordinary and necessary; (3) the expense has to be incurred in a trade or business; and (4) good records must be provided."

Even if one is willing to assume that the population of cases is homogeneous so that macro observations of past cases can predict future case results, the sampling variation must be considered. For example, consider the percentages presented at the bottom of Table 3 [Misiewicz, 1977, p. 938]. Using the binomial distribution, we have calculated 95 percent confidence intervals for the percentages he obtained. The results are shown in Figure 1. In general, the confidence intervals are very wide, indicating that one incurs substantial risks in drawing conclusions based on his sample averages.

MUST CONSIDER PRECEDENTS

Moreover, even if sampling variation is ignored, Misiewicz has not justified his failure to consider the courts' rationale in their determination of how any or all of the four criteria apply to the particular fact patterns under examination. For him to say that a taxpayer must emphasize the trade or business factor to argue successfully the deductibility of an education expense is to state the obvious, *i.e.*, that Section 162 of the Internal Revenue Code applies to this issue. In fact, the legal system would abuse its authority if some other criteria were utilized. Thus, criteria 1, 2, and 3, identified by Misiewicz are consistently present in any determination under Section 162 of the Code. Therefore, having the knowledge that these factors are controlling will cer-

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[1] The authors wish to thank John Tripp for calling this issue to our attention.

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FIGURE 1

SIGNIFICANT CONSIDERATION PERCENTAGES COMPARED WITH 95 PERCENT CONFIDENCE LIMITS

	Deduction Allowed (3 cases)			*Deduction Disallowed (17 cases)*		
	Table 3 Average	*Lower Limit*	*Upper Limit*	*Table 3 Average*	*Lower Limit*	*Upper Limit*
Section 262	0	0	71	53	28	77
Ordinary and Necessary	33	1	91	18	4	43
Trade or Business	67	9	99	82	57	96
Poor Records	0	0	71	6	0	29

tainly not "facilitate tax research" as he concludes, but is an obvious starting point in any traditional legal research methodology.

Traditional legal research methodology is the application of precedent to the particular facts under examination.[2] Only by applying established precedent can normative generalizations be determined in finding a solution to a particular controversy. The application of precedent in conjunction with statute interpretation is the only methodology that precludes arbitrariness in legal decision making. Consequently, in concluding that there is no need to determine the relationship of these considerations to the courts' decision, Misiewicz ignores the essence of judicial decision making.

SUGGESTED TAX RESEARCH PROCEDURES

Phillips and Hoffman [1979] have identified the following procedures for effective tax research:

1. Problem identification;
2. Finding the appropriate tax law sources;
3. Assessment of the validity of the tax law sources;
4. Arriving at the solution or alternative solutions with due consideration given to the facts of the particular case;
5. Communicating the solution to the taxpayer or judicial forum;
6. Applying new developments to the solution.

These procedures are diagrammed in Figure 2; the broken lines indicate those steps particularly germane to the proposed transactions [Phillips and Hoffman, 1979, p. 47].

One may conclude that the traditional legal research methodology described above is a more realistic response to the challenging dynamics present when confronted with multiple sources of law. The macro-case analysis as described by Misiewicz affords no realistic alternative to the Socratic design indigenous to established modes of legal inquiry. The search for certainty by the adaptation of quantitative methods poses no relief from the systematic procedures as diagrammed.

Misiewicz also credits macro-case analysis for the discovery that it is very difficult to deduct educational expenses in the courts overall and hard to sustain in each court individually. One need not turn to macro-case analysis to reach this conclusion since the Supreme Court has stated that deductions, in general, are a matter of Congressional grace and will be narrowly construed against taxpayers if there is any doubt about their application [*New Colonial Ice v. Helvering,*

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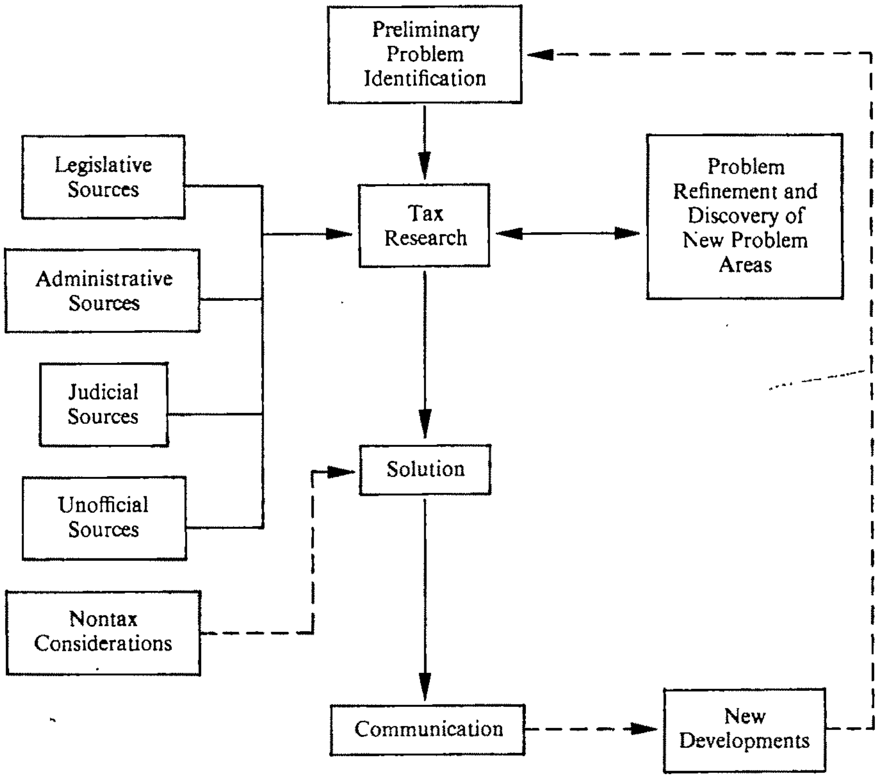
[2] For a discussion of how precedents are applied to particular fact situations, see Sommerfeld and Streuling [1976, Chapter 2].

FIGURE 2



1934]. Thus, Misiewicz's conclusion reaffirms the role that the judiciary must play in allowing only those deductions specifically provided for by statute.

STRONGEST CASES ARE LITIGATED

Moreover, even ignoring sampling error, the taxpayer's failure to prevail in the litigated cases does not prove that the deduction is difficult to claim. It is undoubtedly true that thousands of taxpayers are successful with this deduction. A possible explanation for the preponderance of IRS victories is that they litigate their strongest cases. In fact, there is a rule of thumb that if, in the Appellate Conferee's judgment, the Government's case has a success probability of less than 20 percent, the taxpayer is given full settlement [Horvitz, 1976, p. 55]. Further, when the Government's chances of success are judged to be less than 80 percent, compromise is sought. Consequently, the macro-case analysis does not really establish the probability of success or loss in asserting the education expense deduction.

SUMMARY

In summary, legitimate legal research methodology has as its foundation the advocacy posture present in any legal forum empowered to resolve conflicting issues. In the tax area the interest of revenue collection collides with the interest of tax minimization. Only through pursuing the arguments on either side of an issue can a solution be obtained. The macro-case analysis approach discussed by Misiewicz is not an effective substitute for traditional legal research methodology.

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A Macro-Case Analysis Approach to Tax Research—A Reply

Kevin M. Misiewicz

The thrust of the authors' observations [Horvitz and Finley, 1979] is that macro-case analysis "is not an effective substitute for traditional legal research methodology" and that it affords "no realistic alternative to . . . established modes of legal inquiry." I agree that it is not a "substitute" or an "alternative." That's why my article said that this method can provide "important insights" [Misiewicz, 1977, p. 935] and a "useful pattern of information" [Misiewicz, 1977, p. 936] and that it can "facilitate tax research" [Misiewicz, 1977, p. 938]. It is a supplement to "a reading of some of the cases" [Misiewicz, 1977, p. 935] in an area. The authors expend much effort in criticism of something I didn't say.

However, the authors go further and imply that macro-case analysis is, therefore, of no value since it is not a substitute. To argue successfully that macro-case analysis provides no additionally useful information not forthcoming from traditional legal research requires refutation of the sources using it and cited in the article. Additional applications are found in Moore [1973], Bond [1977], Boyd [1977], Englebrecht and Davison [1977], Fowler [1977], and Madeo [1977]. Uncertainty reflected in the article's example may be reduced by expansion of the sample size to fit the researcher's risk aversion.

The authors also appear to miss the essence and the purposes for macro-case analysis. For it, too, is the application of precedent to the particular facts under examination. The difference is in the way precedential information is collected, organized, and analyzed. Objectivity is the key in an expanding morass of judicial pronouncements. Choosing only objectively determinable factors minimizes the subjectivity normally inherent in traditional legal research. Researcher's findings are capable of replication, and subsequent developments require only adding (and possibly deleting) cases in the sample. The problems of memory loss or involvement in dicta are reduced. To state that this objectivity "ignores the essence of judicial decision making" is (1) to ignore the possibility of judges reaching a conclusion and then constructing a rationale leading to it (as likely demonstrated in recent Supreme Court decisions), (2) to overlook judges acting as social policy-makers to improve on the work of other institutions [Horowitz, 1977], and (3) never to have had the pleasure of reading case-by-case in order to figure out how to "defensibly" weigh factors in the valuation of closely-held corporations.

Many people used to think that man was not meant to fly, but most would now

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agree that the airplane is a valuable complement to other forms of transportation which are still necessary in order to get to the airport. The Comment authors should consider more seriously flying on the wings of macro-case analysis.

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Probabilistic Approaches to Return on Investment and Residual Income: A Comment

K. H. Chan, S. F. Lam and Roger Tang

ABSTRACT: This comment demonstrates as erroneous the method Ferrara proposed for computing the mean, standard deviation, and alternative probability intervals of ROI based on normality assumptions. To develop alternative probability intervals at different levels of significance, it is necessary to recompute the Geary transformation after substituting appropriate standard normal values in the equation. To estimate the mean and standard deviation of ROI, the use of Taylor series approximations provides a justifiable methodology.

In the July 1977 issue of THE ACCOUNTING REVIEW, Ferrara presented several procedures for determining probabilistic estimates for return on investment (ROI) and residual income (RI) [Ferrara, 1977]. The probabilistic approaches demonstrated were: (1) normality assumptions, (2) Monte Carlo simulations, and (3) Tchebycheff-type inequalities. The high-medium-low approach was also briefly mentioned.

Monte Carlo Simulations and Tchebycheff-type inequalities are well-known probabilistic techniques. The approach using normality assumptions is not as widely known and thus must be carefully evaluated before being applied. Unfortunately, there are errors in Ferrara's discussion of the normality approach which may generate ROI estimates that are substantially different from those computed when an appropriate procedure is used. This comment identifies the errors in Ferrara's procedure and provides an appropriate procedure for estimating ROI parameters and probability intervals based on normality assumptions.[1]

In the following sections, an outline of Ferrara's procedure is presented together with identification of the errors. An alternative procedure which overcomes the problems associated with Ferrara's method is then provided. Ex-

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[1] A related issue is the reliability of the input data that enter into the ROI and RI models, particularly the problem of autocorrelation as discussed by Jensen [1979]. As a general rule, reliable inputs *together with* an appropriate procedure for analysing them are necessary to yield dependable accounting information for decision making.

The authors wish to thank Professor George Marsaglia of Washington State University, Professor Tom Beechy of York University, and the reviewers for their helpful suggestions.

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amples are given to demonstrate the impact of the errors by comparing the erroneous estimates with the estimates obtained using the appropriate procedure.

NORMALITY ASSUMPTIONS AND ROI: THE FERRA PROCEDURE

Ferrara determined probability intervals and estimated the mean and standard deviation of ROI when both net income, y, and investment x, are normally distributed and when C.V.$(x) < 0.39$, C.V.$(y) > 0.005$ (where C.V. denotes the coefficient of variation) for any correlation between x and y. Defining ROI as

$$r = y/x, \qquad (1)$$

Ferrara then proposed using the following steps to generate ROI estimates:

(I) A probability interval of r is determined by solving the following quadratic which is known as the Geary transformation [Geary, 1930]:

$$r^2(\mu_x^2 - z^2\sigma_x^2) + r(2z^2\rho\sigma_x\sigma_y - 2\mu_x\mu_y) + (\mu_y^2 - z^2\sigma_y^2) = 0, \qquad (2)$$

where $\rho =$ the coefficient of correlation between x and y, and $z =$ the standard normal variate.

(II) An estimate of the mean of r is computed as:

$$\mu_r = \frac{r_1 + r_2}{2}, \qquad (3)$$

where r_1 and r_2 are, respectively, the lower and upper limits of the probability interval of r obtained in Step (I).

(III) An estimate of the standard deviation of r is computed as:

$$\sigma_r = \frac{r_2 - \mu_r}{z}. \qquad (4)$$

(IV) To obtain an alternative probability interval (r'_1, r'_2), the results in (II) and (III) are used as follows:

$$\begin{aligned} r'_1 &= \mu_r - z'\sigma_r, \\ r'_2 &= \mu_r + z'\sigma_r, \end{aligned} \qquad (5)$$

where z' is the standard normal value for the desired level of significance.

THE ERRORS IN FERRARA'S PROCEDURE

While Step (I) results in an appropriate estimate of the probability intervals for r, the remaining steps are in error. Use of Steps (II) to (IV) will generate incorrect estimates of the mean, standard deviation, and bounds of alternative probability intervals as noted below.

Mean and Standard Deviation

According to Step (II), the mean μ_r is estimated as the simple average of the two limits of the probability interval constructed in Step (I). However, this computation assumes symmetry of the distribution of r. Since no such assumption is stated by Ferrara, the actual estimate of μ_r may be significantly different. For example, Figure 1 shows two distributions which have identical 95 percent probability intervals because the tail probabilities are the same in the two distributions, yet the means are quite different and are not the simple average of the two limits. Moreover, the estimate of the standard deviation in Step (III) is erroneous because it is derived from an incorrect estimate of the mean and because it is based on the incorrect assumption that r is normal.[2] A careful reading of the Hayya, *et al.* paper [1975] indicates that the appropriate procedure for estimating the mean and standard deviation must involve the use of Taylor series expansions, as will be discussed later.

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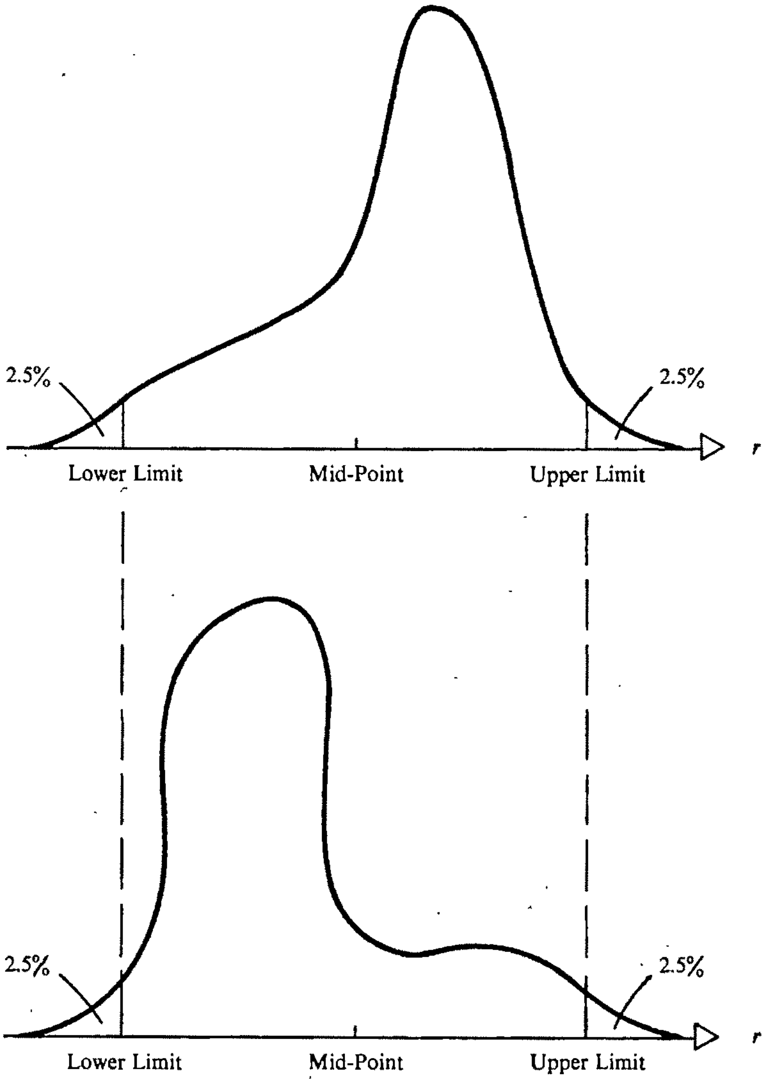
[2] The use of z and Equation (4) assumes normality for r.

FIGURE 1

DISTRIBUTIONS WITH IDENTICAL 95% PROBABILITY INTERVALS BUT DIFFERENT MEANS



Alternative Probability Intervals

Step (IV), relating to the estimate of alternative probability intervals of ROI, is erroneous because it also is based on the assumption that the mean is equidistant from the two limits. This is a short cut that results in erroneous estimates.

To construct alternative probability intervals correctly, the Geary transformation (Equation (2)) should be used. However, Ferrara implied that the transformation can only be used to construct a 95 percent interval. He stated, "to develop probability intervals with an α error level other than 5 percent, one would have to re-examine and perhaps extend the data simulated by Hayya, et al" [p. 599]. This statement is incorrect. The variable z in

TABLE 1

ESTIMATES DEVELOPED USING FERRARA'S STEPS (I) TO (IV)
($\mu_x=30{,}000$, $\mu_y=10{,}000$, $\sigma_x=8{,}000$, $\sigma_y=3{,}000$, $\rho=0.2$)

	Initial Probability Interval			μ_r	σ_r	*Alternative Probability Intervals*		
	Probability and z value	r_1	r_2			*Probability and z value*	r_1'	r_2'
Case 1	95% (1.96)	0.1385	0.7224	0.4304	0.1490	90% (1.65)	0.1846	0.6762
						99% (2.58)	0.0461	0.8148
Case 2	99% (2.58)	0.0805	1.0505	0.5655	0.1880	90% (1.65)	0.2553	0.8757
						95% (1.96)	0.1971	0.9340
Case 3	90% (1.65)	0.1667	0.6240	0.3954	0.1386	95% (1.96)	0.1237	0.6670
						99% (2.58)	0.0378	0.7529

Equation (2) is standard normal.[3] It can be 1.96 (for a 95 percent interval of ROI), 1.65 (for a 90 percent interval of ROI), and so forth. Indeed, the illustration given by Geary [1930] has a standard normal value of 3.57, indicating that the value of z does not have to be 1.96. As shown by Hayya [1977], the only restriction on the value of z in Equation (2) is

$$|z| \le \frac{\mu_x}{\sigma_x} = \frac{1}{\text{C.V.}(x)} \tag{6}$$

Thus, the Geary transformation can be extended to other probability levels, and the use of Step (IV) is inappropriate.

A Numerical Example

The effects of these errors can be significant, as illustrated in Table 1, which uses the Ferrara procedure and the following data:

$$\mu_x=30{,}000,\ \sigma_x=8{,}000,\ \text{C.V.}(x)=0.27$$
$$\mu_y=10{,}000,\ \sigma_y=3{,}000,\ \text{C.V.}(y)=0.30$$
$$\rho=0.20$$

We computed a correct 95 percent probability interval using Step (I). However, the mean and standard deviation computed by following Steps (II) and (III) are incorrect. Likewise, computations of the 90 percent and 99 percent probability intervals using Step (IV) are incorrect. These results are shown as Case 1 in Table 1.

To demonstrate the impact of the errors, we contrast the results obtained above by constructing 99 percent and 90 percent intervals for this set of data correctly using Step (I). The results are labeled as Cases 2 and 3. We then followed the incorrect procedure [Steps (II) to (IV)] to estimate the mean, standard deviation, and alternative probability intervals for these two cases. If the Ferrara procedure were correct, the means and standard deviations should be similar for all three cases. Likewise, the probability intervals at any given significance level should be the same regardless of whether they were computed via Step (I) or as alternative intervals via Step (IV). However, a comparison of the three cases reveals that the estimates of the mean and standard deviation of r in the three cases are significantly different, and that the probability intervals computed for the same significance level are also very different. This is contrary to what would be expected if the Ferrara procedure were correct.

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[3] Equation (2) is the same as formula (9) in Hayya, *et al.* [1975]. From formulas (6) and (9) in Hayya, *et al.* [1975], the variable z is standard normal at $\alpha=0.05$ if $\text{C.V.}(x)<0.39$, $\text{C.V.}(y)>0.005$. This $\alpha=0.05$ refers to the level of significance of the chi-square tests used to test the normality of z at different combinations of the coefficients of variation when Hayya developed the limits on the C.V.s. This α of the chi-square test is not related to the α error associated with the probability interval of ROI. If one wishes to change the α error of the chi-square test, then one would have to re-examine the data simulated by Hayya, *et al.*

For example, the 95 percent probability interval computed in Case 1 is (0.1385, 0.7224); the same interval computed in Case 2 is (0.1971, 0.9340). The mean computed in Case 2 is 0.5655, whereas the same mean computed in Case 3 is 0.3954, a difference of 0.1701, or 30 percent of the Case 2 estimate. These examples indicate that the Ferrara procedure yields inconsistent and erroneous estimates.

The data used in Table 1 satisfy the C.V. conditions stated by Ferrara [$\text{C.V.}(x)<0.39$, $\text{C.V.}(y)>0.005$, any ρ]. When a more restrictive set of conditions [$\text{C.V.}(x)\leq 0.09$, $\text{C.V.}(y)>0.19$, $|\rho|\leq 0.5$] is satisfied, the inconsistencies in the Ferrara procedure tend to be smaller.[4] However, our main interest in this comment is the first set of conditions because it is broader and was used by Ferrara in his paper.

A CORRECT INTERPRETATION OF THE HAYYA, *ET. AL.* PROCEDURE

According to Hayya, *et al.* [1975], when

$$\text{C.V.}(x)\leq 0.09,\ \text{C.V.}(y)>0.19,\ |\rho|\leq 0.5, \quad (7)$$

the ratio r can be considered approximately normally distributed. Under these very restrictive conditions, the standard formula for normal variables can be used to construct probability intervals for r. That is,

$$\text{Prob}\left[(\mu_r - z_{1-\alpha/2}\cdot\sigma_r) < r < (\mu_r + z_{1-\alpha/2}\cdot\sigma_r)\right] = 1-\alpha, \quad (8)$$

where z is a standard normal.[5] However, the mean and variance of r must be estimated before (8) can be used. Hayya, *et al.* [1975] recommended the use of the second-order Taylor series approximations:[6]

$$\begin{aligned} \mu_r &\doteq \frac{\mu_y}{\mu_x} + \frac{\sigma_x^2\mu_y}{\mu_x^3} - \frac{\rho\sigma_x\sigma_y}{\mu_x^2}, \\ \sigma_r^2 &\doteq \frac{\sigma_x^2\mu_y^2}{\mu_x^4} + \frac{\sigma_y^2}{\mu_x^2} - \frac{2\rho\sigma_x\sigma_y\mu_y}{\mu_x^3}. \end{aligned} \quad (9)$$

If the C.V.s of x and y do not satisfy (7), but they do satisfy the conditions chosen by Ferrara, that

$$\text{C.V.}(x)<0.39,\ \text{C.V.}(y)>0.005,\ \text{any } \rho, \quad (10)$$

then the ratio r is not normal. However, the Geary transformation of r can be considered approximately normal [Hayya, *et al.*, 1975, p. 1339] and therefore can be used to construct probability intervals. In the previous example with $\text{C.V.}(x)=0.27$, $\text{C.V.}(y)=0.30$, and $\rho=0.2$, not all the conditions stated in (7) are satisfied; thus the Geary transformation should be used. However, the mean and variance of r may still be estimated by (9).[7]

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[4] Using an example in Hayya, *et al.* [1975], ($\mu_x=100$, $\sigma_x=8$, $\mu_y=10$, $\sigma_y=10$, $\rho=-0.4$), and applying Step (II) with the limits of the 99 percent interval, the mean of ROI is 0.1267. On the other hand, using Step (II) and the limits of the 90 percent interval, the mean becomes 0.1106, a difference of 13 percent.

[5] If $\text{C.V.}(x)=0$, Equations (2) and (8) are equivalent and thus give identical results. If $\text{C.V.}(x)\neq 0$ but the conditions stated in (7) are satisfied, Equations (2) and (8) would give similar results.

[6] The true mean and variance of the ratio r are difficult to derive. A distribution function of the ratio r is given by Marsaglia [1965].

Hence, a correct procedure under the conditions stated in (10) is as follows:

I. Construct a probability interval of r using Equation (2). To construct a probability interval with an α different from that of the initial interval, repeat the calculations in Equation (2) after substituting the corresponding value of z (1.96, 1.65, etc.) in the equation. The value of z is restricted by (6).

II. Approximate the mean and variance of r using the Taylor series expansions given in (9).

Table 2 contrasts the correct 95 percent interval calculated by using Equation (2) with the incorrect 95 percent intervals calculated by using Step (IV). In addition, Table 2 gives the estimates of the mean and standard deviation using the Taylor series approximations. We observe that these latter estimates are quite different from those obtained using Ferrara's Steps (II) and (III). Therefore, these findings not only preclude the uncritical adoption of the Ferrara procedure but also provide an appropriate procedure for generating ROI estimates.

TABLE 2

COMPARING ESTIMATES FROM THE FERRARA PROCEDURE WITH ESTIMATES FROM A CORRECT USE OF THE HAYYA, *ET AL.* PROCEDURE

($\mu_x = 30{,}000$, $\mu_y = 10{,}000$, $\sigma_x = 8{,}000$, $\sigma_y = 3{,}000$, $\rho = 0.2$)

	r_1	r_2
Correct 95% Interval (Calculated by using equation (2))	0.1385	0.7224
Incorrect 95% Interval (Calculated by using Step IV and estimates from the 99% Interval)	0.1971	0.9340
Incorrect 95% Interval (Calculated by using Step IV and estimates from the 90% Interval)	0.1237	0.6670

	μ_r	σ_r
Correct Estimates (Calculated by using Taylor series approximations)	0.3517	0.1197
Incorrect Estimates (Calculated by using Steps II and III and the limits of the 95% interval obtained in Step I)	0.4304	0.1490
Incorrect Estimates (Calculated by using Steps II and III and the limits of the 99% interval obtained in Step I)	0.5655	0.1880
Incorrect Estimates (Calculated by using Steps II and III and the limits of the 90% interval obtained in Step I)	0.3954	0.1386

CONCLUSIONS

With the normality assumption approach, the Ferrara procedure for determining the mean, standard deviation, and alternative probability intervals of ROI yields inconsistent and incorrect results. To construct different (1-α) probability intervals for ROI, one must repeat the calculations of Equation (2) after substituting an appropriate value of z in the equation. The value of z should be restricted by Equation (6) but need not be limited to 1.96. To estimate the mean and standard deviation of ROI, the use of Taylor series approximations given in (9) provides a justifiable methodology.

Finally, it should be noted that there are advantages and disadvantages to each of the approaches discussed by Ferrara (normality assumptions, simulations, Tchebycheff-type inequalities, *etc.*). The choice of any one of these approaches in a given situation depends on many factors, including managerial needs and preferences, the availability and characteristics of the data, the cost/benefit of a given analysis and the importance of the analysis to the company. In other words, there is no universally dominant approach. Thus, there are situations where the normality assumption approach may be the most appropriate. A correct methodology for this approach has been demonstrated.

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[7] Ferrara was misled when estimating the mean and standard deviation of r. The estimates in (9) can be used regardless of the values of the C.V.s and ρ. This can be seen from the derivation of (9) which is lengthy and is available from the present authors.

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Probabilistic Approaches to Return on Investment and Residual Income: A Reply

William L. Ferrara

SOMEDAY I hope to write a paper which is so well done that no one will find fault with it. Until such time I shall have to be content with my own human frailties as well as the frailties of those whose work I rely on and those who are kind enough to read my work.

The main thrust of Ferrara [1977] may be summarized as follows: The high-medium-low technique is more viable in the real world than we give it credit for. Restrictive assumptions relative to the use of probabilistic estimating procedures plus non-availability of reliable data, difficulties of statistical manipulations for accountants and others and the costliness of some alternative techniques lead me to this conclusion.

Even a cursory review of my article should reveal the above-stated basic thrust. Thus, it is frustrating to find "A Comment" which not only ignores the basic thrust but concentrates solely on an illustration which I referred to in the following terms, "For ease of explanation we shall start with the rather simplistic case . . . " [1977, 597]. Furthermore, what is more simplistic than the ROI ratio of net income and investment where both are assumed to be normal or approximately normal.

As for what Professors Chan, Lam and Tang [1979] refer to as, "The Ferrara Procedure," I recommend that they carefully re-examine the Hayya *et al.*, paper [1975] from which I adopted it. The procedure is the "Hayya, *et al.* Procedure of 1975" which was modified in a later study by Hayya [1977]. I was not aware of the latter study since my discussions with Professor Hayya concerning his procedure occurred late in 1975.

The statistical methodology of Hayya *et al.* [1975], followed by Hayya's [1977] extension and the additional thoughts of Chan *et al.* [1979], is not an uncommon series of statistical refinements. Undoubtedly, more refinements will follow since there is much food for thought in all three articles.

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MANUSCRIPTS ACCEPTED FOR FUTURE PUBLICATION

(ACCEPTED BETWEEN NOVEMBER 28, 1978 AND FEBRUARY 9, 1979)

Main Articles

Izzettin Kenis, "Effects of Budgetary Goal Characteristics on Managerial Attitudes and Performance"

Iazk Benbasat and Albert S. Dexter, "Value and Events Approaches to Accounting: An Experimental Evaluation"

Richard A. Scott, "Owners' Equity, The Anachronistic Element"

Wei Shih, "A General Decision Model for Cost-Value-Profit Analysis Under Uncertainty"

Edward B. Deakin III, "An Analysis of Differences Between Non-major Oil Firms Using Successful Efforts and Full Cost Methods"

Notes

Kenneth R. Baker and Robert E. Taylor, "A Linear Programming Framework for Cost Allocation and External Acquisition When Reciprocal Services Exist"

Victor Pastena, "Some Evidence on the SEC's System of Continuous Disclosure"

Manuscripts are listed in the chronological order in which they were accepted.

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BOOK REVIEWS

Thomas J. Burns, Editor

EDITOR'S NOTE: Books for review should be sent to Professor Thomas J. Burns, The Ohio State University, 1775 College Road, Columbus, Ohio 43210.

(The policy of the *Review* is to publish only those reviews solicited by the Book Review Editor. Unsolicited reviews will not be accepted.)

A. RASHAD ABDEL-KHALIK and THOMAS F. KELLER, Editors, *The Impact of Accounting Research on Practice and Disclosure* (Durham, N.C.: Duke University Press, 1978, pp. viii, 222, $13.75).

This book contains the papers and discussions that were presented at a symposium held in December of 1975 at Duke University. At this symposium, 35 professors and practitioners attempted to assess the impact that accounting research has had upon practice during the past ten years. In three main papers, six discussions, two papers on future directions, and a synthesis paper, the authors review and evaluate three types of research methodologies. The classes of research examined were (1) *a priori* research, (2) experimental and survey research, and (3) econometric and time series research.

The principal theme of Norton Bedford's paper on *a priori* research is that we need a "theory of accounting theories" to identify the "good" theories that might reasonably be expected to influence practice. Bedford argues that without such a "theory of theories," no causal relationships can be inferred between *a priori* research and practice simply because we observe the appearance of a new practice that is in accord with a previously developed *a priori* research proposition. According to Bedford, the "theory of theories" would evaluate *a priori* research results and thereby establish the causal link between *a priori* propositions and emerging practices. Bedford suggests that "the better a theory of accounting meets the following criteria, the better it is: (1) the criterion of being in correspondence with the real world; (2) the criterion of having the capability to build models; (3) the criterion of being comprehensive; (4) the criterion of being self-consistent; (5) the criterion of being consistent with well-developed theories in other disciplines; [and] (6) the criterion of not rejecting the basic framework of the field . . . (p. 10). Bedford's paper provided very little explicit discussion of what (if any) impact *a priori* research has had upon accounting practice.

The paper on experimental and survey research was written by Thomas Dyckman, Michael Gibbins, and Robert Swieringa. This paper contains a rather good review of the behavioral research literature together with an annotated bibliography. Dyckman *et al.* state that despite the increasing research activity in this area, there has been no "dramatic increase in our body of knowledge." This conclusion is attributed to the impression that there are general problems with the way experimental and survey research has been conducted. Dyckman *et al.* found that much of the work reviewed by them showed a lack of theoretical emphasis, a lack of ties to the work of others, and a lack of rigor. Like the Bedford paper, the paper by Dyckman *et al.* does not explicitly relate research and practice. Dyckman *et al.* simply assert that "the impact of behavioral research on accounting practice has been almost nonexistent." They then reiterate the above-mentioned research problems as the reasons for the lack of impact that this body of research has had upon practice.

Robert Kaplan wrote the paper on econometric and time series research. The Kaplan paper contains an excellent non-technical review of the market association, econometric, and time series literature. Those who find this literature to be esoteric in nature will find the Kaplan review helpful. Kaplan also provides a bibliography. Kaplan concludes that much has been learned from the many empirical studies that have been conducted. We have learned, for example, that accounting numbers do have information content and that, with efficient capital markets, disclosed information will be impounded in prices of securities—it makes no difference where or how it is disclosed. Like the other two papers, however, Kaplan's provides no explicit discussion of what (if any) impact empirical research has had upon accounting practice. In regard to the future, Kaplan's outlook for empirical research is pessimistic because he believes that all of the "easy" projects have already been completed.

With the exception of Maurice Moonitz, the six discussants were all practicing accountants, although some have been academicians at one time. The views expressed in the discussion papers illustrate very well the broadening schism that exists between academicians and practitioners. The two main pleas that emerge from the discussions are: (1) that academicians should make their reports on research more understandable to the practitioner, and (2) that academicians should be more cognizant of practice problems. The discussions are well done and they are sure to cause some self-reflection by academicians.

The two papers on directions for future research were written by Frank Weston and Sidney Davidson. These papers suggest that the profession needs objectives and an analysis of decision-maker models. Weston proposes a large team-type research effort to develop decision models and accounting procedures. Davidson argues for further refinement of the income determination process.

The book concludes with a synthesis by Nicholas Dopuch. Dopuch argues that the market works—if schools base promotion decisions on "academic-type" research output, academicans will produce this type of research. Dopuch also suggests that we need to question further what role research can be expected to play in a world where accounting policy is determined in a regulatory setting.

Few academicians and practitioners would disagree with the proposition that the papers in this book discuss an important issue that deserves analysis and resolution. The extent to which the papers make a positive contribution in this direction is less clear. The reader will, however, find them interesting.

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EVANS, THOMAS G., WILLIAM R. FOLKS, JR. and MICHAEL JILLING, *The Impact of Statement of Financial Accounting Standards No. 8 on the Foreign Exchange Risk Management Practices of American Multinationals: An Economic Impact Study*, Research Report (Stamford, Connecticut: Financial Accounting Standards Board, 1978, pp. xviii, 184, $6.00).

This is a questionnaire study commissioned by the Financial Accounting Standards Board (FASB) to gather evidence regarding changes, if any, in foreign exchange management practices of American-based multinationals induced by the issuance of Statement of Financial Accounting Standards No. 8 (SFAS 8). The monograph is one of the first issued by the FASB in conjunction with its policy of reviewing evidence regarding the economic impact of its pronouncements. The Board's decision to "re-evaluate" SFAS 8 was apparently based partly on the results of this study and others.

The results of the study relate to three separate issues:

1). Comments regarding the current state of the art of foreign exchange risk management (FERM) practices.
2). Current attitudes among financial managers regarding the impact of SFAS 8 on their foreign exchange risk management practices.
3). Changes in the attitudes of financial managers about this impact since 1975, when SFAS 8 was first released.

The results are based on responses to a 22-page mailed questionnaire sent to 432 American firms having "significant" direct investment in at least six foreign countries. After two mailings, usable responses were received from 156 firms (36 percent), including 67 firms who had also responded to a similar survey by the same authors in 1975. The third issue noted above was studied by comparing the results of the two surveys for the 67 "double respondents."

The results of the study can be summarized as follows:

1). There is clear evidence that many of the firms for whom SFAS 8 required a change in accounting policies have changed some aspects of their FERM practices in direct response to SFAS 8.
2). Such changes are reported in the area of foreign capital investment, dividend repatriation, involvement in the forward exchange markets, and debt policy for financing foreign operations.
3). Firms are now generally more sophisticated in their FERM practices than was true in 1975.

4). Many of the changes in FERM practices induced by SFAS 8 led to an expenditure of real resources in order to offset bookkeeping adjustments which involve no cash flows.

5). From the evidence collected, it is not clear whether the SFAS 8-induced changes in FERM practices have significantly altered the after-tax cash flows of the affected firms.

The study includes separate chapters covering the findings regarding the objectives of FERM programs (Chapter 3), the organization for such programs (Chapter 4), translation practices and exposure management (Chapter 5), exchange rate forecasting (Chapter 6), the impact of SFAS 8 on financial planning (Chapter 7), and exposure adjustment techniques (Chapter 8). A separate chapter is also devoted to the direct comparisons of the 1975 and 1978 responses for the "double respondents" (Chapter 9).

As a review of current practices in the area of foreign exchange management, the monograph should be of interest to financial managers and to students or teachers of international finance. These sections, however, are not of direct interest to the accounting profession. But the evidence provided concerning the behavioral impact of one ostensibly cosmetic set of required accounting changes is of direct interest to accountants. In this regard, it is one of the best examples to date of the phenomenon which Prakash and Rappaport have termed "information inductance." (See *Accounting, Organizations and Society*, Vol. 2, No. 1, p. 29.) Whether the economic consequences of FASB pronouncements are or should be relevant to its deliberations is a question generating much current interest. At a minimum, this monograph indicates clearly that such concerns do not constitute mere idle speculation.

The study is clearly written and is indexed for easy access to the specific topics covered. The presentation focuses on the findings rather than on the methodology. The main weakness of the monograph is the lack of concern for such scholarly issues as pre-test procedures, response bias, item validation procedures, or statistical analysis of the findings. These omissions from the presentation are no doubt intentional and are consistent with its "popular" style. However, they do detract from the impact the monograph is likely to have among academic accountants. On balance, the study represents a timely and significant contribution to our knowledge of an important subject area.

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Tracy G. Herrick, *Bank Analyst's Handbook* (New York: John Wiley and Sons, Inc., 1978, pp. xviii, 380, $29.95).

This book is designed to facilitate bank valuation consistent with the particular needs of seven categories of analysts: directors, depositors, borrowers, debt holders, short-term shareholders, long-term shareholders, and employees. A non-technical approach is used throughout the book, which is replete with real-life, numerical examples. As are most handbooks, this book is not intended to be read from cover to cover, but rather in sections depending upon the specific needs of the reader.

Part I examines the information used in bank analysis. Sources of information are delineated. The 10-K form and the shareholders' letter and directory of key personnel of the annual report are described in detail.

Selected financial statements of J. P. Morgan and Co., Inc. are presented, including an item-by-item analysis. Interesting environmental and historical background is furnished for many of the statements and accounts. A warning is given that net income is often affected by the philosophy of bank management. Detracting features are the all-too-terse discussions of bank accounting policies, the statement of changes in financial position, notes to the statements, and the accountant's opinion.

Easily understood methods for detecting four basic patterns in time series of financial data are reviewed. Seasonal variations are emphasized, and two often used methods of estimation are detailed. A third method, Census X-11, is noted as the most advanced approach available, and results of an application are presented. Reasons for this method's superiority, however, are not given. This chapter would have benefitted from at least a cursory examination of regression-oriented approaches to time series analysis. Also, some explanations are not complete, an example being the failure to explain how to utilize the individual seasonal factors computed by the seasonal adjustment method.

Key bank policies are discussed in Part II. Each chapter describes the significance and functions of the factor, standard methods of managing the factor, implications for related factors (*e.g.*, the effect of liquidity policy on profitability), and approaches for measuring the factor. The descriptions of numerous management and measurement policies allows the analyst to choose the "best" method and provides a safeguard against incorrect evaluations based on only one approach.

The author's personal opinions and philosophy, at times, however, lessen his effectiveness. This is seen, for example, in the failure to give adequate treatment to the potential benefits of risk-pricing strategies in the chapter on credit risk policy. In the same chapter, the discussion of securities valuation stresses the costs of using market values without mentioning possible related benefits. The discussion of capital policy concludes with an assertion that there is a best way of measuring capital adequacy, rather than allowing the reader to appraise the pros and cons of different approaches and make his own choice.

Undue importance is sometimes attributed to a single accounting number as an indicator of policy. An example is the description of spread elasticity as "providing a concise summary of the interest rate policy of a bank." Interest rate policy, which is a function of many factors, is unlikely to be summarized in one number.

Profitability is based on the concept that "the best measure of profitability is the return on average total assets." Although return on investment is a popular and convenient measure, its numerous deficiencies are well-documented (*e.g.*, John Dearden, "The Case Against ROI Control," *Harvard Business Review*, May-June, 1969, pp. 124-135). A case in point is the sale of assets earning a return greater than the hurdle rate in order to achieve a higher return on investment.

The strongest segment is Part III, which analyzes the impact of the environment on banks. The structure of U. S. banking is described, a framework for evaluating a bank's performance vis-à-vis various peer groups is provided, and numerous primary and secondary sources of information are listed. Although little information is publicly available for conducting evaluations of international banks, several sources of information are given which are available and a paradigm for preliminary analysis is suggested.

The methods and techniques used by regulatory bodies to control banks and to compete with other regulators are incisively discussed. Electronic banking, regulation of foreign banks, and near-banks are considered. One surprising omission is direct competition by one bank with another.

Part IV, which focuses on bank management, considers ten well-established banking strategies and nine methods of exercising management control. Only in the discussion of the "proprietary skill" are banking strategy examples provided.

Only past strategies are discussed, which is unnecessarily conservative. Also few guidelines to assess management control are provided.

The final segment of the book, Part V, is a framework for performing an overall bank valuation. While five methods of forecasting earnings per share are presented in a clear, non-technical manner, no strategy is suggested for the bank analyst to develop his own model. The omission is significant, since prediction of future performance is a key factor in bank analysis. Market valuation is considered and emphasizes the use of equity securities. Three related market measures are identified and discussed. Two non-market methods are also examined. One of these, bank ratings published by services such as Moody's Investors Service, Inc., is especially useful in view of the limitations of equity prices. A composite evaluation of the policies, environment, management and accounting of a sample bank is contained. The objective of this exercise was to evaluate the bank for each of the seven categories of analysts. Summary ratings were supplied as inputs to a linear aggregation model for each of the analyst groups, and composite evaluations were computed. The simplicity of this approach should be weighed against its potential for causing analysts to overlook interactions among model elements.

Two suggestions should be considered for incorporation in a second edition. First, a glossary would be helpful to analysts seeking to learn only the meaning of a particular term or phrase. Second, the discussion of implications of policies to analysts in the chapters of Part II could be improved by focusing on the analysts who assign the heaviest weights to these policies, as indicated in Chapter 1. For example, although borrowers attach a 50 percent weight to credit risk policy, they are not discussed in the implications section of credit risk policy, while shareholders and depositors who allot much less weight to this policy are discussed. In addition, implications for bank analysts should be discussed in parts of the book which examine the bank's environment and management.

This book is appropriate for bank analysts seeking an initial exposure to the major factors involved in evaluation of banks. The shortcomings noted in this review are probably due to the book's ambitious nature. On balance, however, the author's clear and thorough descriptions will provide the reader with a broad view of the banking industry and an intelligent approach to bank analysis.

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DONALD F. LITZINGER, LINDA NICANDRI and RUDOLPH DEFAZIO, *Elementary Accounting: A Logical Approach* (Columbus, Ohio: Grid Inc., 1978, pp. x, 305, $17.95).

A prime measure of the value of any textbook is its usefulness as a teaching tool. Indeed, an ideal text should be nearly able to stand alone as the cornerstone or foundation of the student's study. With such a text, the role of the teacher becomes that of a guide: to provide direction, to give emphasis, to assist the student with difficult concepts, to elaborate where necessary, and to evaluate the learning process. The authors of this text stated as one of their objectives ". . . to write an easy to read, practically self-study presentation of accounting principles" (p. ix).

The authors accomplished this purpose admirably. The style is light and very easy to read. The material is broken at intervals by illustrations and self-tests that alleviate the tedium that long reading passages can produce. There is an immediate feeling of intimacy with the material that is not usually found in a text, except through long association.

To help build the confidence of the student and to be sure that he has mastered a particular concept before moving on to another more difficult concept, the technique of the self-test was borrowed from the programmed or self-paced text. These self-tests consist of short-answer material and should provide the student with maximum feedback with a minimum time investment. Even more important, through the self-tests the student becomes more involved in the learning process, which should enhance his ability to absorb and retain the material.

There are some additional features of this book that are noteworthy. The text is presented in an 8½ x 11 inch looseleaf style and contains all working papers for use with the problem material. The use of behavioral objectives at the beginning of each chapter tends to give a sense of direction and enhances the continuity of the material from chapter to chapter. There is an excellent discussion of the accounting equations and their interrelationships (Chapter 3). The income statement, balance sheet and capital statement are fully developed in subsequent chapters (Chapters 4-6). There is a rather clear segregation of the accounting and bookkeeping functions, with the explanation of bookkeeping functions contained in a single chapter (6). In the remaining chapters, emphasis is on development of the student's ability to produce bookkeeping entries. Chapter 7 contains a concise discussion of accounting concepts that is superior to that of most fundamental texts.

There is some question that the text could adequately prepare the accounting major for higher level accounting courses. The brevity with which some subjects are treated would make it appear that a follow-on text or course would be needed to prepare the accounting major for a course as crucial and demanding as the traditional intermediate course. For example, the discussion of capital accounts for sole proprietorship, partnership, and corporations are handled in little more than one page (p. 65-66).

However, this text would be admirably suited to a beginning course for non-accounting students whose need for accounting is a good broad-brush presentation.

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WILLIAM S. MCKEE, WILLIAM F. NELSON and ROBERT L. WHITMIRE, *Federal Taxation of Partnerships and Partners*, Volumes I and II (Boston: Warren, Gorham and Lamont, 1977, pp. lii, unpaginated, actual count: 935, $84.00 regular edition and $18.00 student edition).

There is a general agreement among tax practitioners and educators that one of the most complex parts of the Internal Revenue Code is Subchapter K, which deals with the treatment of partnerships and partners under U.S. income tax law. One reason for the complexity is that Subchapter K is based on two conflicting concepts of the nature of a partnership: (1) the "aggregate" concept, which looks at a partnership as nothing more than the aggregation of its individual partners, and (2) the "entity" concept, under which the partnership is a distinct entity separate from its partners.

The authors make this point early and amplify it throughout their two-volume work by identifying those provisions in Subchapter K which are influenced by the "aggregate" concept and those influenced by the "entity" concept. This is just one of several interesting and appealing features of this work, which is nothing less than a treatise—a thorough, carefully prepared discourse—on Subchapter K.

The authors explore every aspect of partnership tax law (case law and Regulations as well as Code provisions) in depth and employ numerical examples to assist their exposition and analysis of the more complex provisions and Regulations. See, in particular, the seven-step analysis of Sec. 751(b) (dealing with disproportionate distributions of Sec. 751 properly (unrealized receivables and substantially appreciated inventory) in Chapter 21. Although the primary thrust of this work is expository, the authors at times go further to point out tax planning possibilities. For example, Chapter 18 is given over completely to one important tax-planning question—how to bail out of a tax shelter (organized as a partnership) in its "declining years" when it generates more taxable income than it does pre-tax cash flow. Moreover, the authors employ a writing style which is clear, cogent, and apparently free of error—quite a refreshing contrast from the turgid, ambiguous, and error-laden writings which this reviewer has confronted too often in the tax literature. Another important feature is that the work is in loose-leaf, binder form, so that yearly supplements (covering updates in the law) could be accommodated. The 1978 supplements were in this reviewer's copy, and the authors indicate in their note that they intend to supplement the work periodically.

The quality and style of this treatise is quite similar to that of *Federal Income Taxation of Corporations and Shareholders* by Bittker and Eustice, a highly-regarded treatise published by the same company. While neither of these works is a "textbook" (they don't include problems or questions), both should be considered for use as reading materials in graduate courses on the taxation of partnerships and corporations.

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A. N. Mosich and E. John Larsen, *The CPA Examination: Text, Problems and Solutions* (New York: McGraw-Hill Book Company, 1978, pp. xii, 860, $25.00).

This single hardbound volume is intended for a student possessing "a strong business administration education with a major or an area of emphasis in accounting and is designed as a basic textbook in a one-semester or one-quarter 'CPA Review Course' but . . . can be used effectively by candidates for the CPA examination studying on their own."

The topics included in the standard intermediate and advanced accounting textbooks have been condensed into 12 chapters of frequently appearing topics and a single chapter on less frequent topics, such as bankruptcy, estates and trusts, and personal financial statements. A single chapter is devoted to each of the following: cost accounting, managerial and quantitative methods, income taxes, auditing, and business law.

Each chapter is introduced by general comments on the frequency of coverage which that topic has had on the examination and a list of relevant official pronouncements by the FASB, AICPA, and SEC, followed by a brief discussion and illustration of the "principal theoretical issues." A serious candidate would find each of the official pronouncements essential reading along with the coverage on the topic in a current textbook, since the authors have only summarized and highlighted the principles related to each topic. The authors do indicate that "in addition to all effective official pronouncements of the FASB and the AICPA, the candidate should have current textbooks" in order to prepare adequately.

Included at the end of each chapter are multiple choice and theory questions and practice problems selected from past CPA examinations. Solutions are provided and answers to the more complex multiple choice questions include references or computations. Since the authors have not limited themselves to only the most recent examinations, the candidate is presented with an excellent exposure to the various methods of examining a single topic. All questions and solutions have been updated to agree with the most recent pronouncements.

A unique feature is the section labeled "general maturity problems." The authors have included in this section those questions appearing in the past which do not fit into any of the specific chapters but which generally draw upon the candidate's reasoning ability and knowledge of general business and accounting.

In general, the authors have done a commendable task of summarizing and condensing the mass of knowledge with which a CPA candidate must be familiar to pass successfully the examination; however, *most* candidates will not find this book to be the most helpful in preparing for the CPA examination. For most candidates, it will be too brief and too summarized. The average candidate will not possess the depth of knowledge in income taxes, auditing, and generally accepted accounting principles and business law to make effective use of such a condensed book without additional review material. Most candidates will find the classified problems and questions of great help, but to answer those questions and solve the problems they will have to rely upon their own "extensive library in order to prepare adequately for the examination."

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D. L. SCANTLEBURY and RONELL B. RAAUM, *Operational Auditing*, AGA Monograph Series, Number One (Arlington, Virginia: The Association of Government Accountants, 1978, pp. iii, 94, $5.00).

This timely monograph is the first of a new series to focus on important concerns of financial managers at all levels of government. This series is chartered by the American Association of Government Accountants. The authors have presented the material in nine chapters and have included a case illustrating a "Program Results Audit" adapted from an audit by the General Accounting Office (GAO). Brevity of the chapters seems to imply that this monograph is to be used by persons who have a reasonable understanding of public financial management.

In current literature, the term operational auditing has been used interchangeably with management auditing, effectiveness auditing, program auditing, and performance auditing. In recognition of the imprecision in the literature at the present time, the first chapter is devoted to a discussion of what the authors believe operational auditing includes as contrasted with financial auditing. The full scope of auditing is described as follows:

> *Financial and Compliance Auditing*—whether financial statements present fairly the financial condition and the results of operations, and whether applicable laws and regulations were followed.
>
> *Economy and Efficiency Auditing*—whether resources were employed in an efficient and economical manner.
>
> *Program Results or Effectiveness Auditing*—whether desired results or benefits are achieved (p. 1).

Operational Auditing, as discussed in the guide, applies to the combination of "Economy and Efficiency Auditing" and "Program Results or Effectiveness Auditing." The major objective of Operational Auditing is described as being the determination of whether the organization being audited can operate more cost effectively. This objective is in agreement with the notion that government managers should know whether their programs are achieving the non-monetary goals for which management is responsible.

The differences between Audits of Economy and Efficiency and Audits of Effectiveness, explained in Chapter 3, are similar to discussions in most literature on operational auditing. The remaining chapters of the guide deal with the various aspects of planning, performing, and reporting Operational Audits.

One strength of the monograph lies in the arrangement of the content. The authors give an early introduction to the structural characteristics or building blocks from which an *audit finding* is made. This is done before discussing the procedures followed in actually performing the audit. Presenting the elements of an operational audit finding before presenting the details of the audit process places appropriate emphasis on what is needed to obtain and communicate the essential audit results. This content presentation also encourages a more systematic audit approach which in all probability will lead to savings in auditors' time and effort.

Although the first three chapters appear to be too brief, the coverage of the phases of an operational audit in Chapters 4-9, plus the case illustrating each of these phases, is adequate for a management guide.

The dearth of literature in the area of operational auditing is widely recognized. This guide is a welcome addition to the literature of the area. Although it is designed primarily for the use of public financial managers, others might find this monograph helpful. For example, educators might use the book as supplemental material in governmental accounting or not-for-profit courses.

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Professional Firm Publications

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This is the fourth of a new series designed to highlight accounting firms' publications of possible interest to academics. In recent years the largest public accounting firms have increased the quantity and quality of their accounting publications. Single copies are usually available upon request from the nearest office.

Accounting in an Inflationary Environment, by Lawrence Revsine, published by Laventhol & Horwath (1977), discusses two approaches, general price level and replacement cost accounting, to recognize the impact of inflation in financial statements. Each of these approaches is discussed in a separate chapter that introduces the approach, provides an example, and discusses the meaning of the results. Then the approaches are critically evaluated, and implementation considerations examined. In a subsequent chapter, the relevance of each of the approaches to decision makers is examined (25 pages).

Touche Ross & Co.'s *Health Care Horizons* (1978) presents a series of articles on managerial and policy considerations for health care institutions. One article provides an analysis of revenue and expenses for 135 hospitals during 1976 and 1977; another provides an analysis of specific hospital data over a longer time period (44 pages).

Measuring the Impact of Currency Fluctuations, by Robert Henrey, published by Coopers & Lybrand (1978), presents an approach to examining the impact of foreign exchange fluctuations on income. The approach is designed to determine the impact of foreign currency fluctuations and to explain the factors that have caused the net translation gain or loss. Tables and exhibits are used to illustrate the approach on specific transactions (31 pages).

Research Study on Current-Value Accounting Measurement and Utility, by George M. Scott, published by the Touche Ross Foundation (1978), is designed to provide support for the use of current-value accounting. The study is divided into four sections. The first section provides an introduction and a summary of the contribution of the study. The second section examines, primarily through deductive reasoning and the results of a computer simulation, the usefulness of current-value accounting to external users, management, and society. The third section discusses implementation methods. The fourth section provides a number of appendices which discuss the Touche Ross current-value accounting model, the computer simulation methodology and results, and issues which need further consideration (217 pages).

Capsule Commentaries

THOMAS J. BURNS, *Editor*

Commentaries in this issue are by the Book Review Editor.

WILLIAM T. BAXTER, *Collected Papers on Accounting* (New York: Arno Press, 1978, pp. 194, $25.00).

This book consists of 26 articles and a preface. The preface is a brief (21 pages) but fascinating professional autobiography (50 years) of this well-known British accounting scholar. For example, he did not receive a salary for the first five years of his career. Many of the articles published over four decades are on inflationary accounting, but others are on history, theory, and education. The reviewer enjoyed in particular rediscovering "Approaches to Pricing: Economist vs. Accountant" (with A. R. Oxenfeldt) and reading an account of a colonial bankrupt, the younger brother of John Hancock.

RICHARD P. BRIEF, *Selections from Encyclopaedia of Accounting, 1903* (New York: Arno Press, 1978, unpaginated, $28.00).

This book consists of 17 articles from the 200 contained in the "first handbook of accounting," a six-volume work published in Edinburgh, Scotland. Besides history, the selected articles are on financial and cost accounting; they cover standard subjects in these areas. The original reviews of the Encyclopaedia (from *The Accountants' Magazine*) are also reprinted as are a listing of the principal articles which were not reprinted. A teacher would be interested to compare the subject selections with their counterparts in his current textbook.

MICHAEL CHATFIELD, Editor, *The English View of Accountant's Duties and Responsibilities: 1881-1902* (New York: Arno Press, 1978, pp. 160, $18.00).

Including largely articles from *The Accountant* published late in the last century, the book is chiefly the work of prominent English practicing accountants who have influenced contemporary accounting thought. The editor attempts to trace the evolution of auditing, ethical, and financial reporting standards in the words of such pioneers as Dicksee, Pixley, and Dickinson. The book is recommended for accounting history seminars.

MARC JAY EPSTEIN, *The Effect of Scientific Management on the Development of The Standard Cost System* (New York: Arno Press, 1978, pp. 198, $16.00).

This is a 1973 thesis done at the University of Oregon. As an historical study of the papers of Frederick W. Taylor and early company records, it is an effort to understand the development of managerial accounting. The author's hypothesis is that the scientific management movement had an important effect on the development of the standard cost system. The author details his literature search and supports his hypothesis. The book should be of interest to accounting historians.

S. PAUL GARNER and MARILYNN HUGHES, Editors, *Readings on Accounting Development* (New York: Arno Press, 1978, pp. 206, $25.00).

The editors, former University of Alabama faculty members, present an historical collection of 29 articles, of which all but four were first published in *The Accounting Review*. Covering a wide range of subject matter, the authors include among their number quite a few prominent American and English accounting professors. Although the book would presumably be of most use in a history seminar, it would seem that the articles already would be available to seminar members.

LEONARD W. HEIN, *The British Companies Acts and the Practice of Accountancy*

1844-1962 (New York: Arno Press, 1978, pp. 385, $25.00).

This book was originally presented as a doctoral dissertation at the University of California, Los Angeles, in 1962. This history is principally concerned with the impact of the British Companies Acts upon the practice of the public accountant. In England, the regulation of accounting and accountants has been by statute, rather than, as in this country, by commission. This study discloses that the typical reaction of the British profession has been first to resist change and then finally to capitulate. The major cause of the inclusion of accounting controls is reported to be the failure of the accounting profession to enforce acceptable accounting practices in the community.

ELDON S. HENDRIKSEN, *Capital Expenditures in the Steel Industry, 1900 to 1953: An Investigation of Economic Factors Influencing Their Timing and Magnitude* (New York: Arno Press, 1978, pp. 209, $16.00).

This early empirical accounting work, a 1956 doctoral dissertation (University of California, Berkeley) is a study of the U. S. steel industry's financing during 50 years, 1900-1950. From analyzing funds statements of 12 steel companies, he concludes that capital expenditures, in both the short and the long run, have been closely related to profits, steel output, and current operating funds available after dividends. The book demonstrates the value of funds-flow analysis.

CHARLES T. HORNGREN, *Implications for Accountants of The Uses of Financial Statements by Security Analysts* (New York: Arno Press, 1978, pp. 177, $15.00).

This is the 1955 doctoral dissertation at the University of Chicago for the widely known Stanford professor of accounting. One of the early studies to emphasize a user viewpoint and decision-making, it is still often quoted. Specifically, the author conducted a survey of the available literature on investment analysis, analyzed 123 reports, and interviewed 51 analysts. Not a surprise now, these users called for additional disclosure (*e.g.*, funds-flow statements) but did not express a concern for major changes in financial statements. The chief current merit of Horngren's dissertation is as a background study of how analysts use financial statements.

WILLIAM HOLMES, LINDA H. KISTLER and LOUIS S. CORSINI, *Three Centuries of Accounting in Massachusetts* (New York: Arno Press, 1978, pp. 259, $20.00).

Written to commemorate the Massachusetts Society of CPAs' 75th anniversary in 1975, the book consists of two parts, 15 chapters, and several appendices. The first part (ten chapters) is on early Massachusetts accounting from the time of the Pilgrims until this century; the second part (five chapters) reviews the history of the Society. Each chapter is by a different author, three of whom are not listed on the cover. The three listed authors are Associate Editors of the *Massachusetts CPA Review*; some chapters were published previously in that periodical. Of interest to accounting historians and Massachusetts accountants.

CHARLES WILLIAM LAMDEN, *The Securities and Exchange Commission: A Case Study in the Use of Accounting as an Instrument of Public Policy* (New York: Arno Press, 1978, pp. 353, $25.00).

Much of the current value of this 1949 doctoral dissertation at the University of California, Berkeley is due to the increasing significance of the SEC as a rule-making agency for accountants. For the current trend for SEC accounting courses, this book could prove useful both for its history of the development of the SEC and its analysis of early efforts of the SEC to exercise control over accounting procedures.

RUSSELL DAVIS LANGER, *Accounting as a Variable in Mergers* (New York: Arno Press, 1978, pp. 223, $18.00).

In his recent (1976) University of California, Berkeley doctoral dissertation, the author (and former student of Abraham Briloff and Maurice Moonitz) recommends that the pooling of interests method should be eliminated. His recommendations are the same ones which the APB tried to implement in 1969. But he proposes three changes. Regulated industries should be exempt from a merger accounting requirement.

The profession should not wait for the tax provisions to change. The most important "tactic" of all is for the profession "to fight for its proposal at the SEC." Four cases are analyzed in support of his reviews. Recommended for advanced financial accounting courses.

MAURICE MOONITZ, Editor, *Three Contributions to the Development of Accounting Thought* (New York: Arno Press, 1978, pp. 334, $25.00).

This book consists of a brief essay by the editor on three projects that were instrumental in developing U. S. accounting principles before 1930, the major publications resulting from two projects, and an excerpt from the third one. The projects were: (1) an audit procedure program developed for the Federal Reserve Board in 1917 by the American Institute of Accountants; (2) the Bureau of Information established in 1918 by the American Institute of Accountants to answer inquiries from members; and (3) the starting of the "Students Department" in the *Journal of Accountancy* in 1914. The first project resulted in "Uniform Accounts" published in 1917 and which was last revised in 1936. The effective enforcer of these principles was the commercial bankers. The second project resulted in 33 published bulletins from 1920 to 1929. All three projects are informative about practice of that era. From the third project, in 1925, is reprinted a dispute over funds-flow statements by Paul-Joseph Esquerré and H. A. Finney. Esquerré advocated the "all-resources" concept, while Finney supported the working capital concept. Highly recommended to financial accounting theorists.

GARY JOHN PREVITS, Editor, *Early 20th Century Developments in American Accounting Thought: A Pre-classical School* (New York: Arno Press, 1978, unpaginated, $20.00).

A collection of 17 articles originally published during the period 1900-1929 by leading and influential American accounting authors who preceded Paton, Kohler, Littleton, and May. They are Cole, Dickinson, Esquerré, Hatfield, Kester, Montgomery, Sprague, and Wildman. This excellent anthology drawn largely from inaccessible sources should be a valuable aid for financial theory seminars.

WILLIAM G. SHENKIR, Editor, *Carman G. Blough: His Professional Career and Accounting Thought* (New York: Arno Press, 1978, unpaginated, $25.00).

This is an anthology of articles by one of the most powerful accountants of his era. The strengths (and the defects) of the present accounting profession can be explained to a considerable degree by studying his views. For example, one should read Blough's speech when he was Chief Accountant of the SEC and which led to the establishment of the Committee on Accounting Procedure. Another example is the speech when he was Director of Research for the AICPA that described the research program to be established for the APB. For these reasons, the book is of general interest to all those concerned with accounting. Includes three brief pieces on Blough's life.

FLORENCE R. SNEED, *Parallelism in Two Disciplines* (New York: Arno Press, 1978, pp. 258, $18.00).

The author has investigated the literature relevant to the methods of auditing and history. Much of this 1974 Master's Thesis (University of Texas at Arlington) focuses on the comparisons of evidence in the two disciplines. She concludes that researchers should investigate the impact of social and personal attitudes upon the auditor's work and the feasibility of not only separating fact from interpretation but also of evolving a process such as historiography with which to properly evaluate interpretative evidence. This interesting study might be assigned to auditing courses, especially seminars.

GEORGE H. SORTER, *The Boundaries of the Accounting Universe: The Accounting Rules of Selection* (New York: Arno Press, 1978, pp. 98, $12.00).

This 1963 dissertation at the University of Chicago is concerned with analyzing part of the accounting function, the selection of the events to be recorded. Eighteen rules of selection are derived which, the author argues, describe all of the accepted accounting procedures in the area of selection. The thesis has spawned a number of articles and has influenced several leading textbooks. Recommended to textbook writers and teachers.

REED K. STOREY, *Matching Revenues With Costs: An Analysis of Accounting Adaptation to Uncertainty* (New York: Arno Press, 1978, pp. 191, $15.00).

Portions of this 20-year-old study, a University of California, Berkeley doctoral dissertation, were published previously in *The Accounting Review*. Although the author recommends that inventories be valued at their net realizable value, the major merit of this book is its excellent analysis of the conventional matching and the sale basis for recognizing revenue. As such, it is recommended for students in financial accounting theory courses.

R. G. WALKER, *Consolidated Statements: A History and Analysis* (New York: Arno Press, 1978, pp. 410, $26.00).

This book is a historical study of consolidated statements. It consists of all but the last chapter (published in *Abacus*) of the author's Ph.D. thesis submitted to the University of Sydney in 1976. Two-thirds of the book reviews the U. K. and U. S. backgrounds for consolidated reporting. The last section is an analysis of the ideas and practices of consolidated reporting, and the conclusion is that the case for consolidated statements is not favorable. It would be of general interest to accountants and students in advanced financial accounting courses.

M. C. WELLS, Editor, *American Engineers' Contributions to Cost Accounting* (New York: Arno Press, 1978, pp. 1129, $25.00).

This is a collection of 19 articles published originally from 1873 to 1912 on the efforts of American electric and mechanical engineers to develop systems of cost collection and cost calculation. Engineers were concerned initially with cost records (not cost accounts), as such memoranda by engineers for engineers were too important to be left to accountants. Articles are grouped under four headings: costs and efficiency (5), pricing (5), costing systems (3), and principles (6). The last article, "Axioms Concerning Manufacturing Costs," by Henry R. Towne, calls for the creation of a correct science of industrial accounting. Recommended to anyone with a scholarly interest in cost accounting.

BASIL S. YAMEY, *Essays on the History of Accounting* (New York: Arno Press, 1978, unpaginated, $25.00).

This is a collection of papers by a British accounting historian originally published over the past three decades. With access to the rare book collection of the Institute of Chartered Accountants in England and Wales, the author has divided his work into those articles based on several sets of records or the work of several authors (11 articles) and those articles based on a single set of records or the work of a single author (13 articles). The value of the book is largely to provide inaccessible material to accounting historians. Includes a review of Pacioli.

BASIL S. YAMEY, Editor, *The Historical Development of Accounting: A Selection of Papers* (New York: Arno Press, 1978, unpaginated, $25.00).

The British editor, an accounting historian, has selected materials that emphasize accounting for management and control, which are based on actual accounting records, and which are likely to be inaccessible to students. The 18 articles drawn from 15 sources were originally published over five decades (1933 to 1975) and are based on accounting during many centuries (from medieval to contemporary). Of interest primarily to accounting historians.

STEPHEN ADDAM ZEFF, *A Critical Examination of the Orientation Postulate in Accounting, With Particular Attention to Its Historical Development* (New York: Arno Press, 1978, pp. 234, $16.00).

This 1961 doctoral dissertation done at the University of Michigan is concerned with two views of the business enterprise, the proprietary and the entity. Almost half of the study is devoted to "historical surveys of the somewhat parallel development of politico-economic institutions and accounting theory." The author separates the orientation postulate into "subject" and "beneficiary" subpostulates. Dismissing the "proprietary theory," he proposes contrasting conceptions of the "entity theory" as two alternatives. He also argues that there is no reason to believe that comparability among firms is necessarily destroyed by the concurrent use of more than one orientation approach. Highly recommended for financial theory courses.

Books Received, October 2, 1978 through January 31, 1979

Burch, Jr., John B., Felix R. Strater and Gary Grudnitski, *Information Systems: Theory and Practice*, Second Edition, John Wiley & Sons, Inc., New York, 1979, pp. xv, 571, $17.50.

Committee on International Accounting Operations and Education, *Accounting Education and the Third World*, American Accounting Association, Sarasota, Florida, 1978, pp. xii, 109.

Cabell, David W. E., Editor, *Directory of Publishing Opportunities in Business, Economics and Administration*, Cabell Publishing Company, Beaumont, Texas, 1978, pp. xxxv, 307, $14.95 plus $1.50 for postage and handling.

Courtis, John K., Editor, *Corporate Annual Report Analysis*, Department of Accounting and Financial Management, University of England, Armidale, New South Wales, Australia, 1978, pp. ii, 242.

Cunningham, Gary M., and Charles H. Smith (Assisted by Byron L. Otto), *Accounting for Shareholders' Equity by Texas Corporations*, Bureau of Business Research, University of Texas, Austin, Texas, 1978, pp. 111.

Davidson, Sidney, Clyde P. Stickney and Roman L. Weil, *Financial Accounting: An Introduction to Concepts, Methods and Uses*, Second Edition, The Dryden Press, Hinsdale, Illinois, 1979, pp. xviii, 695.

Doyle, Dennis M., *Efficient Accounting and Record-Keeping*, John Wiley & Sons, Inc., New York, 1978, pp. vii, 116, $4.95.

Dick, George, and Richard Rikert, Editors, *Accounting Trends & Techniques: Annual Survey of Accounting Practices Followed in 600 Stockholders' Reports*, Thirty-Second Edition, American Institute of Certified Public Accountants, Inc., New York, 1978, pp. vii, 416.

Dukes, Roland E., *An Empirical Investigation of the Effects of Statement of Financial Accounting Standards No. 8 on Security Return Behavior*, Research Report, Financial Accounting Standards Board, Stamford, Connecticut, 1978, pp. ix, 102, $3.00.

Fenton, Lawrence S., and Norman A. Fowler, *Hotel Accounts and Their Audit*, The Institute of Chartered Accountants in England and Wales, London, 1978, pp. xii, 287, £10.75.

Financial Reporting and Accounting Standards: Conference Papers, University of Glasgow Press, Glasgow, Scotland, 1978, pp. 80, £6.00 or $15.00.

Frank, J. W., T. F. Kealey and G. W. Silverman, *The Effects and Usefulness of Replacement Cost Disclosure*, Financial Executives Research Foundation, New York, 1978, pp. vii, 124.

Goshay, Robert C., *Statement of Financial Standards No. 5: Impact on Corporate Risk and Insurance Management*, Research Report, Financial Accounting Standards Board, Stamford, Connecticut, 1978, pp. viii, 68, $2.50.

Harvey, Mike, and Fred Keer, *Financial Accounting Theory*, Prentice-Hall International, Inc., London, 1978, pp. xi, 179, $7.95.

Hawkins, David F., and Walter J. Campbell, *Equity Valuation Models: Models, Analysis and Implications*, Financial Executives Research Foundation, New York, 1978, pp. vi, 196.

Heath, Loyd C., *Financial Reporting and the Evaluation of Solvency*, Accounting Research Monograph No. 3, American Institute of Certified Public Accountants, New York, 1978, pp. xiv, 153, $7.00.

Henderson, Scott, and Graham Peirson, *An Introduction to Financial Accounting Theory*, Longman Cheshire Pty. Limited, Melbourne, Australia, 1977, pp. vi, 154, $5.95 Australian.

Horrigan, James O., Editor, *Financial Ratio Analysis: An Historical Perspective*, Arno Press, New York, 1978, unpaginated, $20.00.

Kennedy, Tom, and Charles E. Simon, *An Examination of Questionable Payments and Practices*, Praeger Publishers, New York, 1978, pp. xiii, 416.

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Makridakis, Spyros, and Steven C. Wheelright, *Forecasting: Methods and Applications*, John Wiley & Sons, Inc., Santa Barbara, 1978, pp. xvi, 713, $22.95.

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Miller, Martin A., *1979 Comprehensive GAAP Guide: A Comprehensive Restatement of all*

Current Promulgated Generally Accepted Accounting Principles, Harcourt Brace Jovanovich, Inc., New York, 1978, pp. xii, $42.25.

Milnes, Alan, and David Tillett, *Property Company Accounts*, The Institute of Chartered Accountants in England and Wales, London, 1978, pp. xi, 185, £11.95.

O'Connor, Melvin C., and Gyan Chandra, *Replacement Cost Disclosures: A Study of Compliance with the SEC Requirement*, National Association of Accountants, 1978, pp. vii, 310, $10.95.

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Previts, Gary John, and Richard F. Taylor, *John Raymond Wildman 1878-1938*, The Academy of Accounting Historians, University, Alabama, 1978, pp. viii, 84, $4.50.

Ronen, Joshua, and George H. Sorter, Editors, *Relevant Financial Statements*, Arno Press, New York, 1978, unpaginated, $20.00.

Scapens, Robert W., *Accounting in an Inflationary Environment*, The Macmillan Press Ltd., 1977, pp. xii, 163, £3.95 paperbound.

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Wagner, Charles R., *The CPA and Computer Fraud*, Lexington Books, D. C. Heath and Company, Lexington, Massachusetts, 1979, pp. xvii, 156, $14.00.

Zeff, Stephen A., Editor, *Selected Dickinson Lectures in Accounting 1936-1952*, Arno Press, New York, 1978, unpaginated, $25.00.

JULY, 1979 PLACEMENT INFORMATION SECTION

The deadline for information to be included in the "Placement Information" section is two months prior to the date of publication; i.e. *February 1, May 1, August 1, and November 1. Placement advertising and replies should be sent to the American Accounting Association, 5717 Bessie Drive, Sarasota, FL 33583. All replies to box numbers should be on separate sheets to facilitate forwarding.*

#301 PORTLAND STATE UNIVERSITY located in Portland, Oregon, invites applications for permanent appointments in accounting beginning September 1979. Available positions are at the Assistant and Associate level. Applicants should possess a doctoral degree in accounting although candidates at an advanced dissertation stage will also be considered. Performance evaluation at PSU is based upon a judicious blend of effective classroom teaching, research and publication, and university and community service. The standard teaching load is 9 quarter hours. Programs are offered at both the undergraduate and graduate levels. The department enjoys a very close relationship with the professional accounting community in the state. Vita should be directed to Dr. Michael R. Gaines, Head, Department of Accounting, Portland State University, Portland, Oregon 97207. PSU is an equal opportunity affirmative action employer. All interested persons are encouraged to apply.

#302 WAYNE STATE UNIVERSITY is seeking faculty members in Accounting. Teaching opportunities within our undergraduate and MBA programs are available in all specialties. Earned doctorate and CPA or CMA are preferred, but ABDs will be considered. Salary and rank will be commensurate with qualifications and experience. These positions should be especially attractive to persons desiring to work with the business community because of the University's strategic location and close ties with firms in the metropolitan area. Wayne State University, a large, state-supported institution, is an equal opportunity/affirmative action employer. All qualified candidates are encouraged to apply. Please send vita to Professor A. C. Roberts, Chairman, Department of Accounting, 300 Prentis Hall, Wayne State University, Detroit, Michigan 48202.

#303 ASSISTANT PROFESSOR(S) OF ACCOUNTING. Employment date: Beginning Fall 1979 or later. Require: Ph.D. with a major in accounting CPA or CMA desirable. Teaching interests may be in Financial, Managerial, Auditing, Taxation, or Information Systems with secondary in one or more of the above areas. The courses would be at the B.A., M.B.A., Ph.D. levels. Research and publication is expected in accounting topics. Other duties include academic advising: departmental, college, and university committees; maintaining contact with accounting professional and business organizations; guidance to doctoral students in dissertation research. An affirmative action employer and applications from women or minority candidates are particularly invited. Send letter of inquiry and resume to Dr. Harold Sollenberger, Chairman, Dept. of Accounting & Financial Admin., College of Business, Michigan State University, East Lansing, MI 48824.

#304 M.B.A., C.P.A.—AGE 42. Excellent teacher of undergraduate accounting courses including financial, managerial, advanced accounting and auditing. Class sizes 30–100. Presently ass't. professor. Would like to relocate to school where teaching is primary emphasis. Available September 1979.

#305 CLEVELAND STATE UNIVERSITY is seeking applications for faculty positions in accounting (rank is dependent upon candidates' qualifications). Candidates for assistant professor should have the doctorate (or at least at advanced dissertation stage); C.P.A., C.M.A., or C.I.A. and research capacity favorably considered. Candidates for associate professor and full professor must have doctorate and record of publication. Salary negotiable. Send resume to: Dr. Elise G. Jancura, Chairperson, Department of Accounting & Business Law, Cleveland State University, 1983 E. 24th St., Cleveland, OH 44115, or telephone: (216) 687-4721 Equal Opportunity Employer M/F/H.

#306 ASSISTANT PROFESSOR OF ACCOUNTING. Faculty position open beginning in September, 1979. Desired fields are: financial accounting, tax accounting, and auditing. Responsibilities include teaching some introductory courses. A strong commitment to excellent teaching is most important. Ph.D. desired but will consider a candidate who is ABD or a candidate with an M.A. and CPA. Teaching load is 12 hours. Salary is competitive with other 4-year colleges. An equal opportunity employer. Contact Matthew A. Stephenson, Chairman Department of Economics and Accounting, Wofford College, Spartanburg, South Carolina 29301.

#307 SAN DIEGO STATE UNIVERSITY, School of Accountancy, is seeking candidates for faculty positions leading to tenure, or for temporary positions as Visiting Professors or full-time lecturers with a primary interest in taxation or financial and managerial accounting. Faculty positions above the assistant rank are also possible for appropriately qualified individuals. Candidates for assistant professor should have a doctorate in hand or be near completion. Salary is commensurate with education and/or experience. San Diego State University is an Equal Opportunity/Affirmative Action/Title IX Employer. San Diego State University does not discriminate against handicapped persons. San Diego State University invites applications from all qualified persons of both sexes and of all ethnic backgrounds. Please send resumes to Professor Kevin M. Lightner, Director, School of Accountancy, College of Business Administration, San Diego, California, 92182.

#308 FACULTY POSITIONS. The University of Colorado at Colorado Springs is seeking candidates for two faculty positions leading to tenure with a primary interest in financial or managerial accounting. Faculty positions above the assistant rank are possible for individuals with a strong teaching and publication record. Candidates for assistant professor should have completed doctorate. ABD candidates will be considered where evidence shows probably timely completion of dissertation. UCCS is an Equal Opportunity/Affirmative Action employer. Send resume to Professor Kirk Wilcox, College of Business and Administration, University of Colorado, Colorado Springs, CO 80907. An Equal Opportunity Employer.

#309 MASTERS AND PH.D. INTENDING students are invited to apply for admission to the Department of Accounting and Financial Management at the University of New England, Armidale, New South Wales, Australia. Masters three-semester programs may be taken with specialist concentration in Accounting, Finance, Systems, Small Business Management and Legal Studies. Ph.D. three-year programs involve a major dissertation. No coursework, preliminary examinations or continuous residence in Australia are required. Masters intake is March and July. Ph.D. intake is flexible. Some TA and RA opportunities exist. For further details write Head, Department of Accounting and Financial Management.

#310 CHAIR OF ACCOUNTING, (U.K.)—at the University of Southampton, England, which is situated close to the New Forest some 70 miles from London. This newly created position is the second Chair in the Department of Accounting and Management Economics of the University. The position, tenured from August 1980, is a senior one for which U.K. (full) professorial salary is payable. Applications should be made before 30 September 1979 to Mr. D. A. Schofield, Secretary & Registrar, University of Southampton, from whom further particulars relating to the post may be obtained.

#311 TEACH ACCOUNTING to small classes of highly motivated students. Full time appointment beginning Fall, 1979. Minimum requirements: Masters degree with accounting concentration. Contact: Hubert Pinney, Chairman, Department of Accounting, Mount Union College, Alliance, Ohio 44601.

#312 BUSINESS MANAGER/AFRICA (BOTSWANA). International Voluntary Service, Inc. A private, independent, non-profit agency, IVS supplies technical assistance for development projects in developing countries mainly in the form of skilled volunteer technicians recruited internationally. Assume responsibility for financial and inventory control of a small scale agricultural business; establish an accounting and administrative reporting system; and train and supervise small local staff. Qualifications: two years experience in small business management, stock and credit control. Please submit resumes to Ms. J. Nachison, 1717 Massachusetts Avenue, NW, Suite 605, Washington, D.C. 20036, (202) 387-5533. Equal Opportunity Employer.

#313 THE COX SCHOOL OF BUSINESS at Southern Methodist University has a position available in Accounting at the assistant professor level. Qualifications include a primary interest in teaching at both graduate and undergraduate levels, research potential leading to publication in professional journals, and an earned doctorate. Competitive salary and excellent working environment. Southern Methodist University is an Equal Opportunity Affirmative Action employer. Please submit vitae to: Thomas Hedges, Acting Chairman, Accounting Subject Area, Cox School of Business, Southern Methodist University, Dallas, Texas, 75275.

#314 ACCOUNTING FACULTY. Applications are invited for accounting faculty positions at Villanova University for appointments beginning September '79 and '80, Ph.D. (Acctg) Preferred; MBA/CPA with progress toward Ph.D. considered. Research/teaching experience desirable. AACSB accredited. Department has 15 F/T faculty and 800+Acctg majors. Send resumes to Daniel J. O'Mara, Chairman, Accounting Dept., Villanova University, Villanova, PA 19085. *Equal Opportunity, Affirmative Action Employer.*

#315 THREE POSITIONS at the Assistant/Associate level. Ph.D. required. ABD in the last stages of dissertation will be considered. Positions require the ability and interest to teach at the undergraduate and graduate level. Salaries are competitive at the AACSB level. Contact: Dr. Bernard L. Martin, Dean, College of Business Administration, University of San Francisco, San Francisco, CA 94117 (415) 666-6771. The University of San Francisco is an Equal Opportunity Employer.

#316 ACCOUNTING. Assistant or Associate Professor. Position available August, 1979. Ph.D. or DBA required. Will consider ABD actively engaged in working toward a realistic completion date. C.P.A. desirable. Salary and rank competitive depending on qualifications and experience. Full range of undergraduate and graduate courses. Excellent living conditions in progressive, modern metropolitan area. Send resume to Dr. Frederick D. Whitehurst, Chairman, Department of Accounting, Old Dominion University, Norfolk, Va 23508. An Affirmative Action/Equal Opportunity Employer.

#317 IDAHO STATE UNIVERSITY seeks an assistant professor in accounting. Candidates should have doctorate degree or ABD, desire to teach, quality of recommendations, compatability with existing faculty and the likelihood of a long-term commitment to college. Duties will entail teaching both financial and managerial accounting. Salary is dependent on qualifications. Idaho State University is a teaching oriented university in an outstanding outdoor recreation area located in a community of approximately 50,000 residents. Applicants should contact James M. Kelly, Dean, College of Business, Idaho State University, Box 8020, Pocatello, ID 83209. Phone 208/236-2135.

#318 DIRECTOR OF SCHOOL OF BUSINESS. Administrative responsibility, graduate and undergraduate, for programs in management, marketing and accounting. 30 Faculty. Doctorate required. Business experience desirable. Salary competitive. Excellent fringe benefits. Attractive community. Start August 1979 or January 1980. Members of protected classes encouraged to identify themselves. Send resume and names of three references to Dr. Hoyt Wilson, School of Business, University of Northern Iowa, Cedar Falls, Iowa 50613.

#319 NEW HAMPSHIRE COLLEGE has a full-time position and a one-year appointment in its Department of Accounting beginning in September, 1979. Rank and salary negotiable. Minimum requirement is MBA/CPA. Business and teaching experience desirable. Excellent fringe benefits package and summer, continuing education and graduate teaching opportunities. Private consulting encouraged. For further information contact: Dr. James Grace, Jr., Academic Dean, New Hampshire College, 2500 North River Road, Manchester, NH 03104. An equal opportunity, affirmative action employer.

#320 THE UNIVERSITY OF TEXAS AT EL PASO, Department of Accounting, has faculty openings at the associate and assistant rank for Fall 1979. Applicants must have, or be near completion of, a doctorate with a major in Accounting. C.P.A. is desirable. Teaching will be at the undergraduate and M.B.A. level; salary is competitive. This university of 16,000 students enjoys warm, dry, year-round climate. The Southwest border location with nearly 100 twin-plant operations offers a diverse industrial base and a combined metropolitan population of approximately one-million with below average cost of living. Send resume to Sharron Hoffmans, Chairman, Department of Accounting, College of Business Administration, University of Texas at El Paso, El Paso, Texas, 79968. Equal opportunity employer.

#321 THE UNIVERSITY OF THE DISTRICT OF COLUMBIA seeks a Professor or Associate Professor of Accounting. Salary and Rank would be appropriate to qualifications and experience. CPA desired or CMA. The position is open for fall 1979 or January 1980. The Accounting Department offers an undergraduate degree major and participates in an MBA degree program with a concentration in accounting. The College of Business and Public Management has candidate status with the AACSB. Normal teaching load is three courses which will include both graduate and undergraduate courses. We are an urban university with both day and night classes. Emphasis is on teaching and teaching related activities. Washington, D.C. libraries provide excellent research facilities. Community service is encouraged. The University is located in Washington, D.C. within walking distance or by subway to libraries, historical sites, cultural programs and national political activities located in the nations capital. We are an affirmative action equal opportunity employer. Send resume to: Dr. Herbert V. Ladley, Chairman, Department of Accounting, University of the District of Columbia, 1331 H Street, N. W., Washington, D.C. 20005. Telephone: (202) 727-2230.

#322 PH.D., J.D., M.S.T., M.B.A., C.P.A., C.M.A., 34, male, married, four years of business experience, ten years of teaching experience including finance, accounting, taxation and business law, seeks faculty position in taxation, preferably with school with tax program in pleasant climate. Numerous publications; currently tennured professor.

#323 CHAIRPERSON. The Department of Accounting, Kent State University is seeking candidates interested in chairing the department with an expanding undergraduate program as well as M.B.A.; M.S. in Accounting; and D.B.A. graduate programs. Qualifications include a Ph.D. or D.B.A. degree, a dedication to teaching excellence in graduate and undergraduate courses; ability to supervise dissertations; research evidenced by scholarly publications and presentations; a demonstrated ability to maintain a close working relationship with business and professional organizations, and qualification for appointment as associate or full professor of accounting. Professional certification is desirable. Rank and salary are dependent upon candidate's experience and scholarly record. Minimum salary: $29,000. Starting date is July 1, 1980. Application deadline date: September 30, 1979. Submit detailed resumes and names of three references to Dr. Stanley J. Hille, Dean, College of Business Administration, Kent State University, Kent, Ohio 44242.

#324 THE INSTITUTE OF MANAGEMENT ACCOUNTING of the National Association of Accountants has an opening for an Examination Project Manager. Responsibilities will include contribution to the development, preparation, and administration of the Certificate in Management Accounting (CMA) examination. A Masters Degree, a professional accounting certificate (CMA is preferred), business experience, and teaching assignments in management accounting are required. Qualified candidates should send their resumes to Dr. James Bulloch, Director, Institute of Management Accounting, 570 City Center Building, Ann Arbor, Michigan 48104.

#325 THE UNIVERSITY OF TULSA has two openings in accounting at the assistant or associate professor level beginning September, 1980. These positions are in taxation and general accounting. Applicants for assistant professor should have doctorate or be near completion. Applicants for associate professor must have doctorate, teaching experience, and demonstrated ability in research. CPA or CMA is desirable. The University's undergraduate and graduate programs in business are AACSB accredited. Send resume to John K. Harris, College of Business Administration, University of Tulsa, Tulsa, Oklahoma 74104. An equal opportunity/affirmative action employer.

CASH FLOW OR EARNINGS:
An Experiment on Functional Fixation and the Valuation of the Firm

by
A. Rashad Abdel-khalik
University of Florida
and
Thomas Keller
Duke University

This small monograph reports on the research findings of a field study concerning the effects of the disparity between reported accounting earnings and cash flows (stemming from the switch to LIFO) on the subjective valuation of the business enterprise. Two small samples of security analysts acted as decision makers in forming judgments about the expected stock prices under a prespecified set of conditions and for a set of six firms, two of which are identical in every respect except for the accounting change. The judgments were based on data extending over a period of three years. The simulation of real time took the form of sequential decisions from one period to another. The judgments made by decision makers formed triangular probability distributions of expected rates of return for each judge. By using a tight experimental design, the authors were able to evaluate the consistency of judgments between and within subjects.

The results show that decision makers valued the firm(s) switching to LIFO lower than or equal to their valuation of the similar firm(s) that continued on using FIFO. The authors claim that these findings support the hypothesis that users of accounting data are fixated on basing their judgments on reported accounting numbers even if these numbers do not correspond to real earnings. According to them, potential difficulty could exist if accounting policies are to be based on models of judgments different from the models actually utilized by users.

Another interesting aspect of the monograph is the attempt to reconcile these findings with other evidence. The authors also report their views and perspective concerning recent studies about accounting information and valuation.

Published by the American Accounting Association as Volume No. 16
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Price to AAA members is $4; non-members, $6.

AMERICAN ACCOUNTING ASSOCIATION 1979–1980 FELLOWSHIP WINNERS

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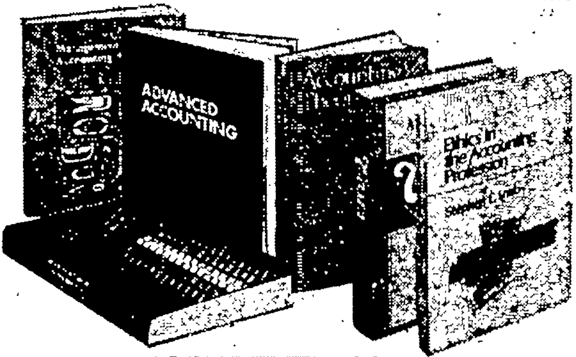

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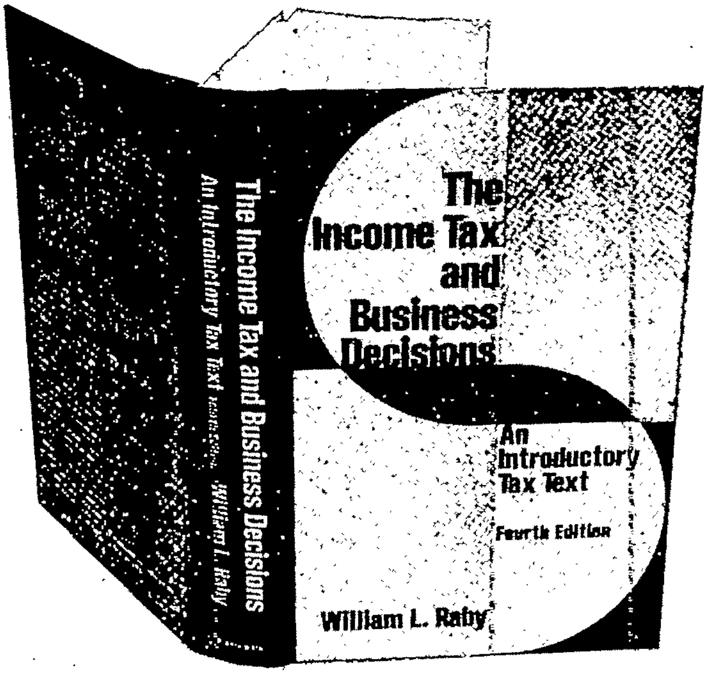

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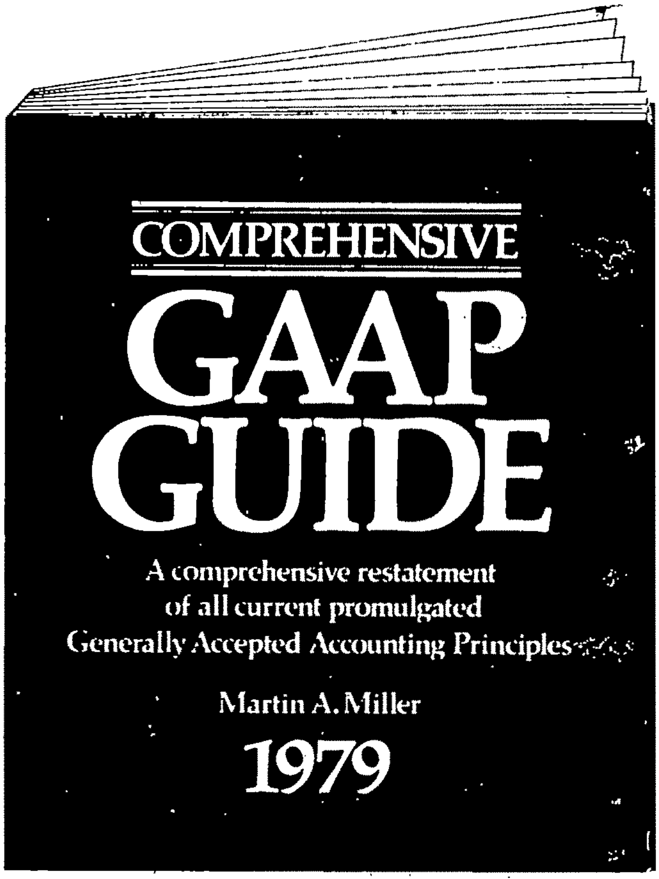
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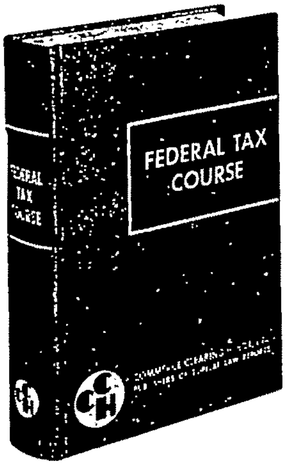

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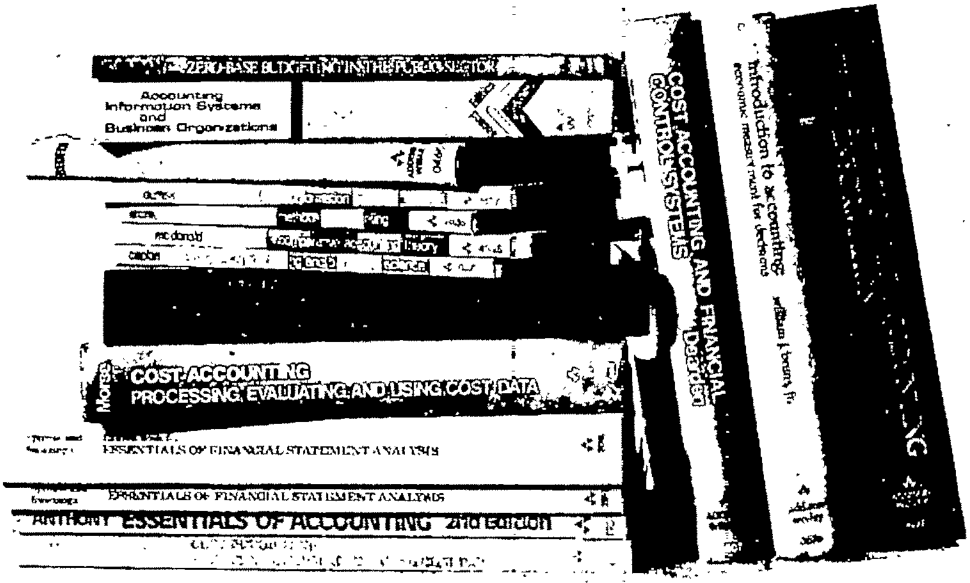
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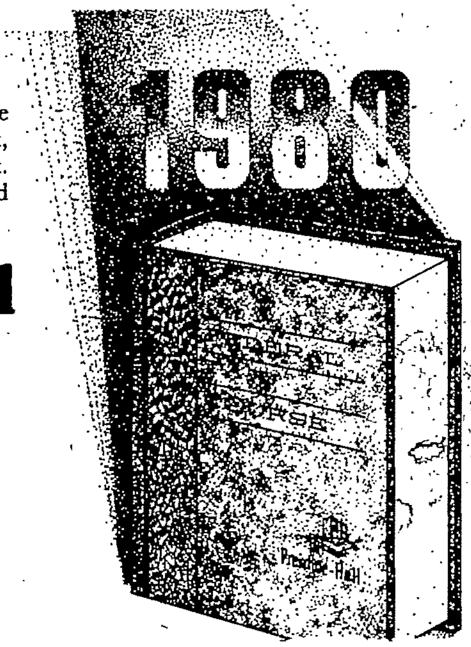

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THE ACCOUNTING REVIEW
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October 1979

An Entity-Relationship View of Accounting Models

William E. McCarthy

ABSTRACT: This paper is an extension of previous work aimed at integrating ideas in the field of database systems with accounting theory. Unlike others, however, it does not propose use of a particular type of database system. Instead, it concentrates on an overall design methodology—the entity-relationship model—which transcends specific database theoretical structures. A complete model is specified for a small retail enterprise, and some accounting uses for the derived system are shown. Finally, the use of an entity-relationship model in integrating aspects of measurement theory, causal double-entry, and "events" accounting with computerized information systems is discussed.

A NUMBER of recent studies have addressed the issue of integrating accounting information systems and computer database technology. Colantoni, Manes and Whinston [1971], Lieberman and Whinston [1975], and Haseman and Whinston [1976] used aspects of Sorter's [1969] "events" accounting theory and incorporated them into a hierarchical database model. More recently, Everest and Weber [1977] suggested the use of Codd's [1970] relational framework to overcome the hierarchical model's lack of data independence. Finally, Haseman and Whinston [1977] constructed an accounting system using the network or CODASYL [1971] approach.

This paper reviews the same process of integrating accounting with database models, but on a more general level that does not necessitate commitment to any particular system. In lieu of debating the comparative advantages of the hierarchical, relational, or network approaches, the contention will be made here that an accounting system is most naturally modeled in a database environment as a collection of (1) real world *entities* and (2) *relationships* among those entities. Using methodology conceived by Chen [1976], an entity-relationship model of an accounting system will be developed that will overcome some of the difficulties encountered by the authors mentioned above, such as the use of accounting "artifacts." Additionally, readers will see that this method of development will allow a system designer to incorporate explicitly into an accounting model aspects of measurement theory proposed recently by Mock [1976] and causal double-entry advocated by Ijiri [1975].

This paper is based on research originally conducted for my doctoral dissertation at the University of Massachusetts. I would like to thank the following faculty members there for their guidance and comments: Van Court Hare, Joseph Sardinas, Conrad Wogrin, David Stemple, and Morton Backer. Financial support for this work was provided by Coopers & Lybrand through a grant to Michigan State University.

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DATABASE ABSTRACTION PROCESS

The data in any information system is an abstraction of some aspect of reality. The more recently developed *database* information systems require that this data representing a particular slice of reality be organized in a structured manner that will remain consistent with itself and maintain its integrity over time.

Incorporating methodologies suggested by Chen [1976], Sundgren [1974], Date [1977], and Will [1974], Figure 1 portrays this structured abstraction process as it applies to an accounting system.

Beginning with LEVEL 1, note that a database system is intended to model some part of the real world or some reality. In an accounting context, this reality is an economic enterprise defined by the business entity principle [Yu, 1976, p. 245].

At LEVEL 2, the description of reality narrows to those aspects that are of interest to intended database users. Sundgren [1974, p. 61] refers to this slice of reality as the "object system," and for the accounting example, it includes information about two matters of substance: (1) the economic states of the enterprise and (2) the events occurring over time that alter those economic states.

As the abstraction process moves to LEVEL 3, it passes from the world of realities, or principals as they are called by Ijiri [1975, Ch. 3], to the world of data models or surrogates. A data model is intended to be a description of the logical structure of the object system as seen by the community of database users. It is a scheme that represents, with data, the organization of the conceptual world of interest.

In traditional accounting, it is here that the "artifacts" (such as the chart of accounts) deplored by Everest and Weber are encountered. Those authors characterize many traditional accounting structures as "useful taxonomies, classification schemes, or naming conventions rather than real entities" [Everest and Weber, 1977, p. 342] and consequently conclude that database systems are not able to accommodate them easily.

This paper proposes to depart from traditional accounting at LEVEL 3, and to use instead an entity-relationship view of an enterprise to construct its accounting data model. Additionally, the scheme to be developed will not be limited by the principles of double-entry and monetary measurement, but will be allowed instead to assume more of the multidimensional and disaggregated aspects proposed by "events" accounting theorists [Sorter, 1969].

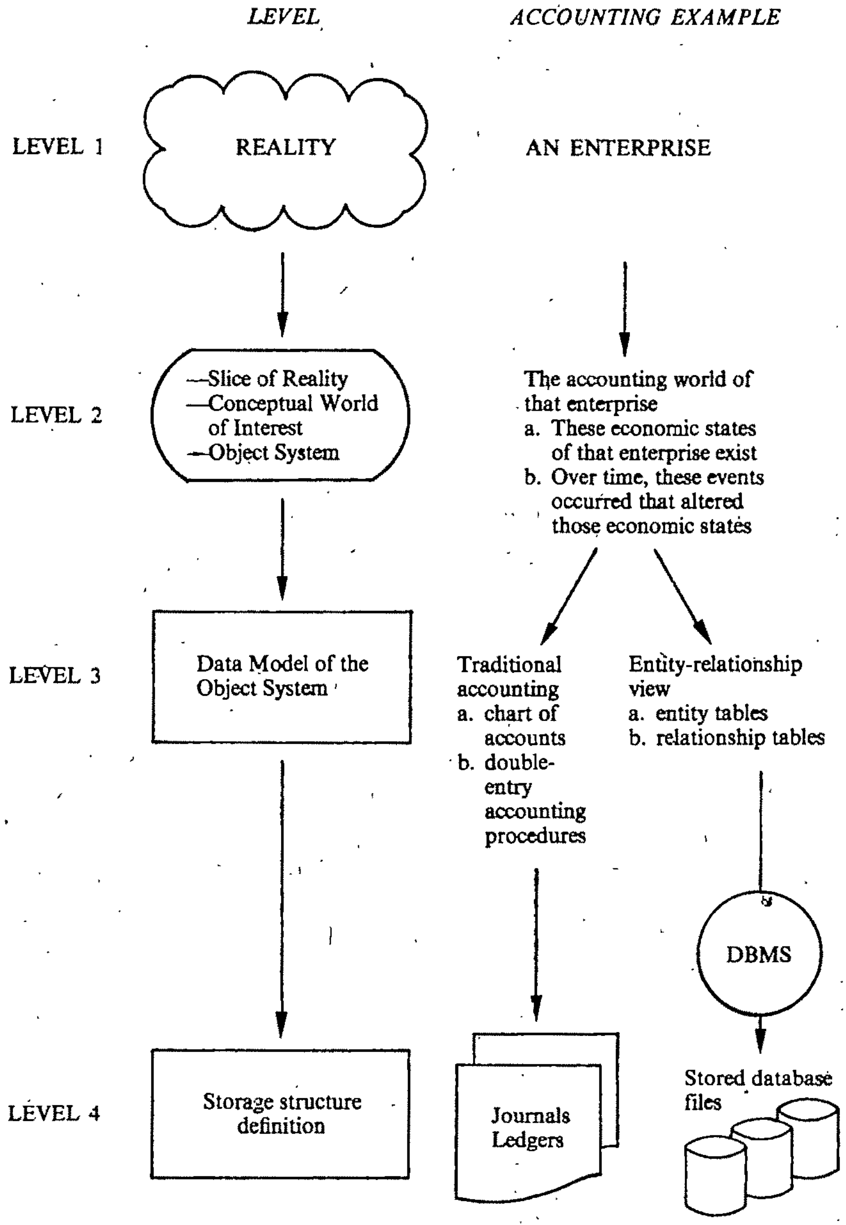
LEVEL 4, the storage structure definition, will not be of interest in the treatment here. However, note that once an object system has been modeled on an entity-relationship basis, it is possible to translate the data model of LEVEL 3 to the storage structure definitions of LEVEL 4, using the definition language and facilities of most existing database management systems (DBMS).

LEVEL 3 of the database abstraction process—development of an accounting data model for an enterprise—will now be treated in detail.

AN ACCOUNTING DATA MODEL

A chart of accounts and its accompanying double-entry procedures might be viewed simply as a scheme for organizing, classifying, and aggregating financial data. Additionally, however, it represents the imposition upon an accountant of a particular mode of thinking about the economic affairs of an entity. For example, when queried about the "things" that accounting deals with, an accountant might list items such as "prepaid revenues," "retained earnings," or "liabili-

FIGURE 1
DATABASE ABSTRACTION PROCESS


LEVEL
ACCOUNTING EXAMPLE
LEVEL 1
REALITY
AN ENTERPRISE
LEVEL 2
—Slice of Reality
—Conceptual World of Interest
—Object System
The accounting world of that enterprise
a. These economic states of that enterprise exist
b. Over time, these events occurred that altered those economic states
LEVEL 3
Data Model of the Object System
Traditional accounting
a. chart of accounts
b. double-entry accounting procedures
Entity-relationship view
a. entity tables
b. relationship tables
DBMS
LEVEL 4
Storage structure definition
Journals
Ledgers
Stored database files

ties" because these, among others, constitute the elements in his/her predefined world of interest. Collectively, these account names and double-entry procedures represent a data model of an enterprise's economic aspects.

This predisposition toward certain types of "things" of interest will be discarded here. Instead, this paper will view an object financial system without "traditional-accounting colored" glasses and use the following steps to construct an accounting data model [Chen, 1976]:

1. Identify (a) the *entity* sets such as classes of objects, agents, and events that exist in the conceptual world and (b) the *relationship* sets that connect those entities;
2. Construct an *E*ntity-*R*elationship (E-R) diagram that will exhibit the semantic nature of identified relationships;
3. Define the characteristics of entity and relationship sets that will be of interest to particular system users, and specify mappings that will identify those characteristics; and
4. Organize the results of steps 1, 2, and 3 into entity/relationship tables and identify a key (unique characteristic) for each entity/relationship set.

As each of these steps is considered in the following sections, its application to accounting will be made more concrete by using a small retail enterprise as an example.

Identification of Entity/Relationship Sets

The process of viewing an object system and identifying its relevant entities and relationships cannot be described exactly, because it will normally include a wide variety of systems analysis techniques (such as those detailed by Taggart and Tharp [1977]). The particular list of entities and relationships that any one person produces might differ quite legitimately from another person's list, depending upon their differing backgrounds and perceived uses of information. A guiding principle here for accountants is that in enumerating entities they limit themselves to real phenomena that can be distinctly identified and remain clear of accounting "artifacts." Everest and Weber [1977, p. 356] supply direction in this process by warning designers to avoid the use of "naming tree" entities (that is, accounts used for presentation or accumulation purposes only).

For a small retail enterprise, the entity sets (groups of objects, agents, events) of interest in the accounting object system might include those 16 items shown in Figure 2 (a). For simplicity, only this limited list will be used in the rest of the discussion here. A modeling of a real enterprise would probably produce a larger and more exhaustive group of entities, including such additional objects as buildings, such additional agents as federal and state governments, and such additional events as equipment disposals and purchase orders.

Once the entity sets have been identified, system design proceeds to specification of sets of relevant relationships that may exist among them. A partial list (a more complete diagram is given later) for the retail enterprise is shown in Figure 2 (b).

The bases for explicitly recognizing relationships between the various entities will again be peculiar to the person constructing the data model, but it is of interest to note at this point the rationale for connecting some of the *Event* entities with each other. With the exception of the "order" event which is not, traditionally speaking, an accounting event at all, the *Event* (- - -) *Event* links represent explicit manifestations of Ijiri's [1975, Ch. 5] causal double-entry conventions; that is, each change in the resource set of the enterprise is linked explicitly to another change by means of a causal relationship. In Mattessich's terms, these events would be called "a pair of requited transactions [where] . . . one transaction is the legal or economic consideration of the other" [1964, p. 450].

Again, there is no claim to absolute "truth" in the entity/relationship sets given in Figure 2. They are not intended to be exhaustive enumerations, only illustrations of Chen's initial design stage.

FIGURE 2

Objects
Equipment
Inventory
Cash

Agents
Stockholder
Employee
Customer
Vendor

Events
Order
Sale
Purchase
Cash Receipt
Cash Disbursement
Equipment Acquisition
Capital Transaction
General and Administrative Service
Personnel Service

(a) Entity sets in an accounting data model

Event (- - - -) *Event*
Sale (fills) Order
Cash Receipt (payment for) Sale
Cash Disbursement (payment for) Personnel Service

Agent (- - - -) *Event*
Employee (employed in) Personnel Service
Vendor (supplier of) General and Administrative Service
Customer (made to) Sale

Object (- - - -) *Event*
Cash (flow of) Cash Receipt
Inventory (line item) Sale
General and Administrative Service (allocate cost of) Equipment

(b) Some relationship sets (not complete listing)

Construction of an Entity-Relationship Diagram

After identification of appropriate entity and relationship sets in an object system is completed, data modeling continues with a further analysis of how these concepts fit together. The semantic nature (or real world character) of a relationship is examined at this stage and is portrayed through the use of Entity-Relationship (E-R) diagrams. Again for simplicity, this paper will illustrate only a portion of the real world possibilities, in this case binary relationships. Such relationships concern associations between just two entity sets and have consequently three basic types: (1) one-to-one, (2) one-to-many, and (3) many-to-many. Each of these cases is illustrated below.

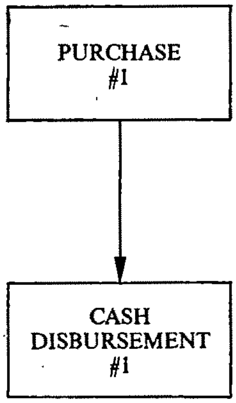
A one-to-one (1-to-1) relationship specifies a correspondence between a pair of entities, one from each of the two connected entity sets. Suppose, for example, that the small retail enterprise had an operational rule that all purchases were to be paid for, in full, exactly five days after receipt. Each purchase event would correspond then to only one cash disbursement event as exhibited in Figure 3 (a). Chen's E-R diagram would depict this 1-to-1 relationship in the manner shown in Figure 3 (b).

A *one-to-many* (1-to-*n*) relationship specifies a correspondence between just a single entity in one entity set and many entities in another entity set. Using the example again, suppose that the enterprise billed its customers once a month for all sales during the preceding month and that the customers pay in full shortly thereafter. In this case, each cash receipt event would correspond to multiple sale events as seen in Figure 4 (a) and (b).

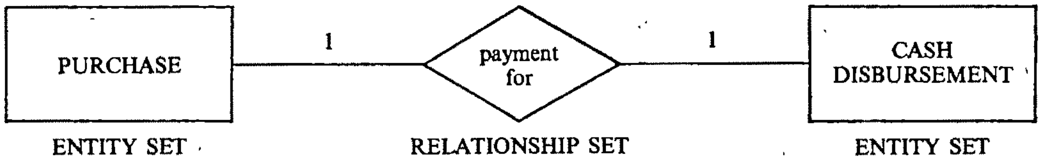
Finally, a *many-to-many* (*m-to-n*) relationship specifies not only a possible correspondence between one entity in a first set and many entities in a second set;

FIGURE 3

A ONE-TO-ONE CORRESPONDENCE



(a) Two related event sets



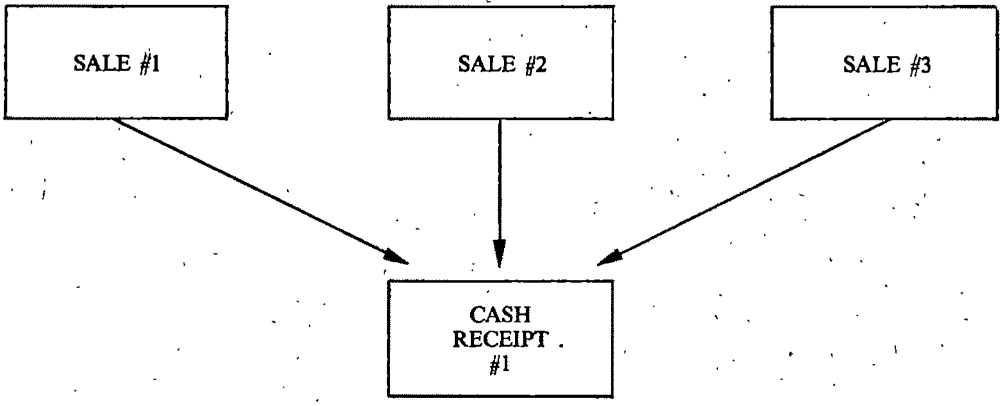
(b) E-R diagram

but also a possible correspondence between one entity in the second set and many entities in the first set. To illustrate in the case of a relationship between the *SALE* and *INVENTORY* entity sets from the retail example, suppose not only that each sale consist of many products, but also that each product participates in many sales. This bidirectional mapping is shown in Figure 5 (a) and (b).

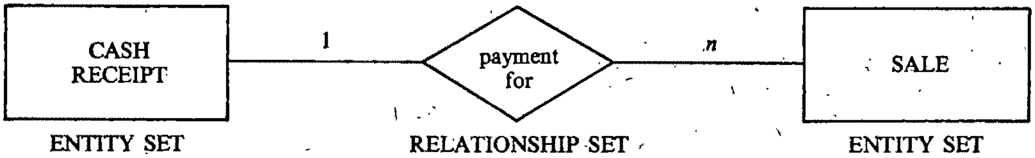
Extending this same kind of analysis, an E-R diagram can be specified for the entire retail enterprise as shown in Figure 6. In this particular example, the use of a limited list of entities and binary relationships has produced a relatively simple and well integrated E-R diagram; however, more realistic (and hence, more complicated) situations can be represented in a similar fashion. For instance, if the additional event of equipment disposal were included for the enterprise, it would be possible to model the acquisition of an asset for cash and a trade-in by showing a three-way association among the entities equipment acquisition, equipment disposal, and cash disbursement.

Figure 4

A One-to-Many Correspondence



(a) Two related sets of events



(b) E-R diagram

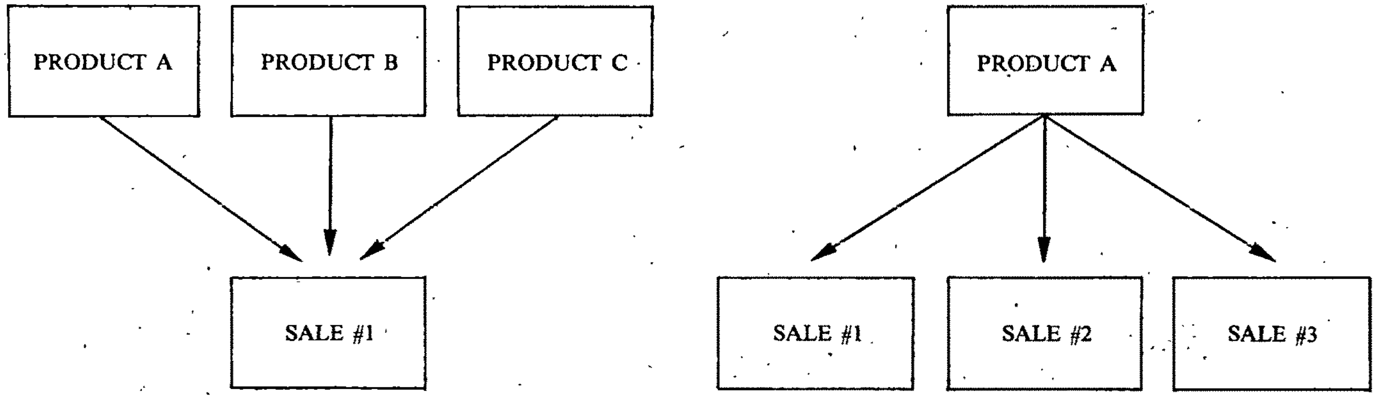
Identification of Characteristic Mappings

Once an E-R diagram has been constructed for the object system, the entity-relationship modeling process moves to a more detailed level of system design by starting to identify the relevant properties or characteristics of each entity/relationship set. Similar to the process of determining the entities and relationships themselves, this identification procedure can be described only in very general terms. The final listing of characteristics will be heavily dependent upon the designer's perception of the ultimate decision environment and information need. A framework proposed by Mock [1976, p. 88] addresses the needs of this design phase. His outline is based upon accepted principles of measurement theory and lists criteria certain to help in reducing the unstructured nature of this process.

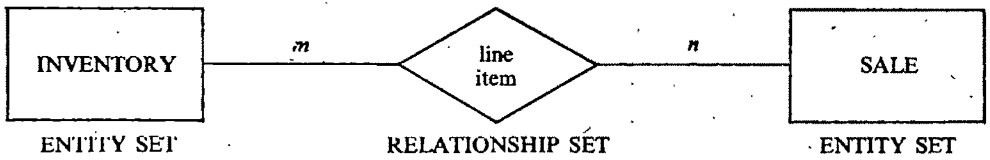
Specifying all of the characteristics for each entity/relationship set given in Figure 6 would be a prohibitively long process. Therefore, this section will be limited to mappings for two entity sets—

FIGURE 5

A MANY-TO-MANY CORRESPONDENCE



(a) Related object and event sets—two views



(b) E-R diagram

FIGURE 6

E-R DIAGRAM FOR THE ENTIRE RETAIL ENTERPRISE

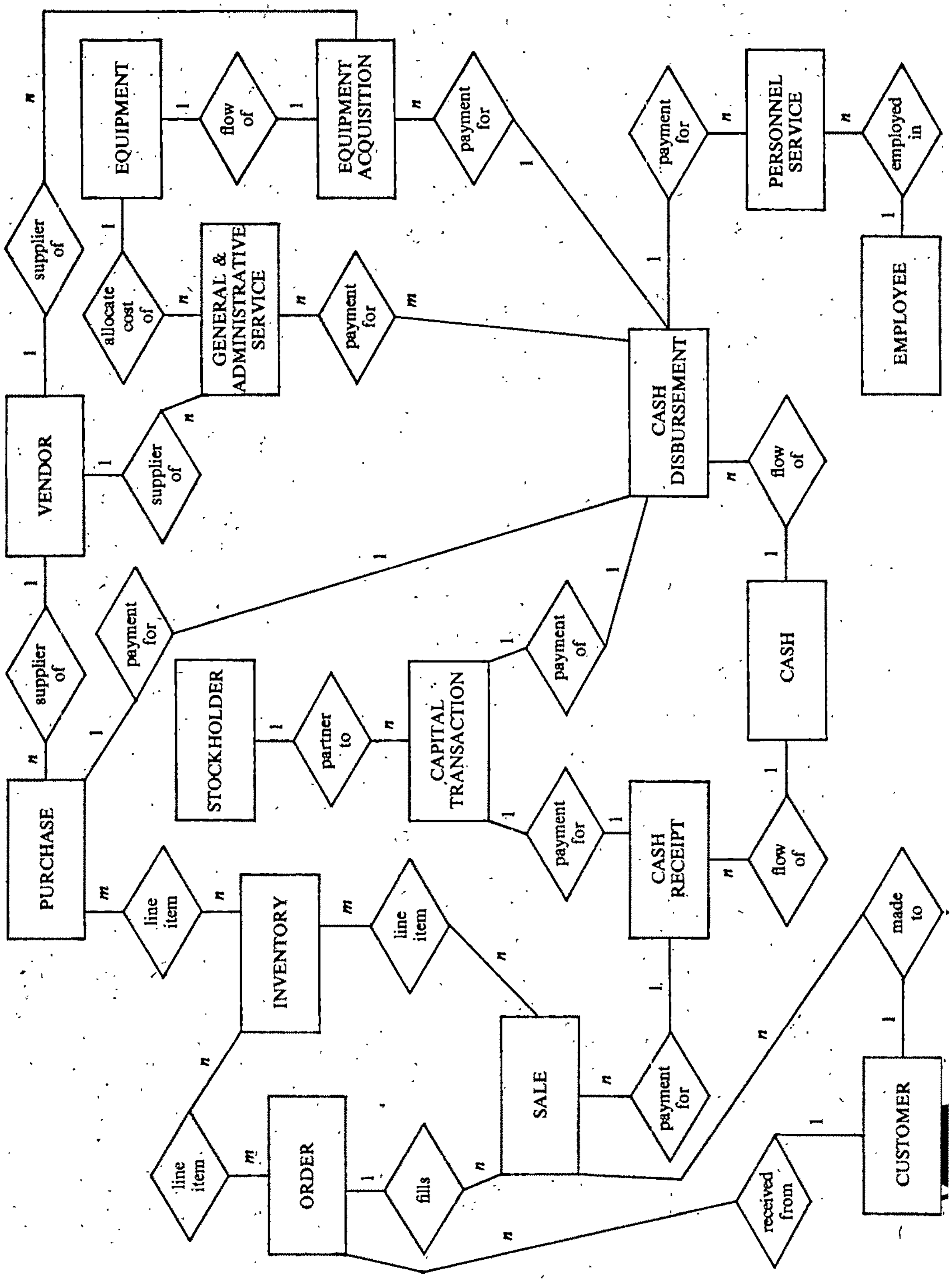
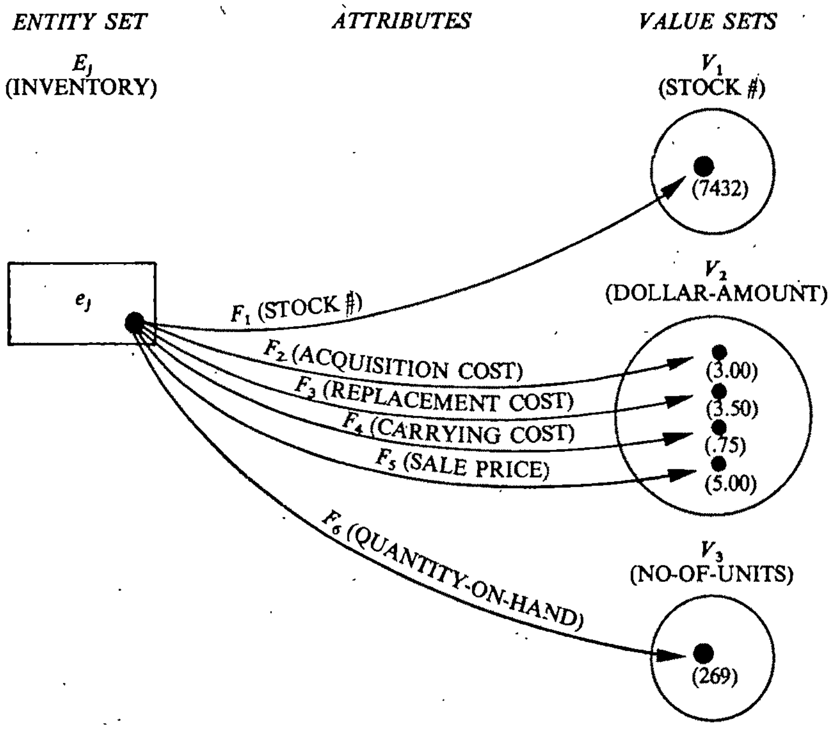


FIGURE 7

CHARACTERISTIC MAPPINGS DEFINED ON ENTITY SET *INVENTORY*



SALE and *INVENTORY*—and the relationship set that connects them—*SALE line item*. Additional mappings for the other sets, and possibly for these three sets as well, would have to be accomplished before the data model would be completely specified.

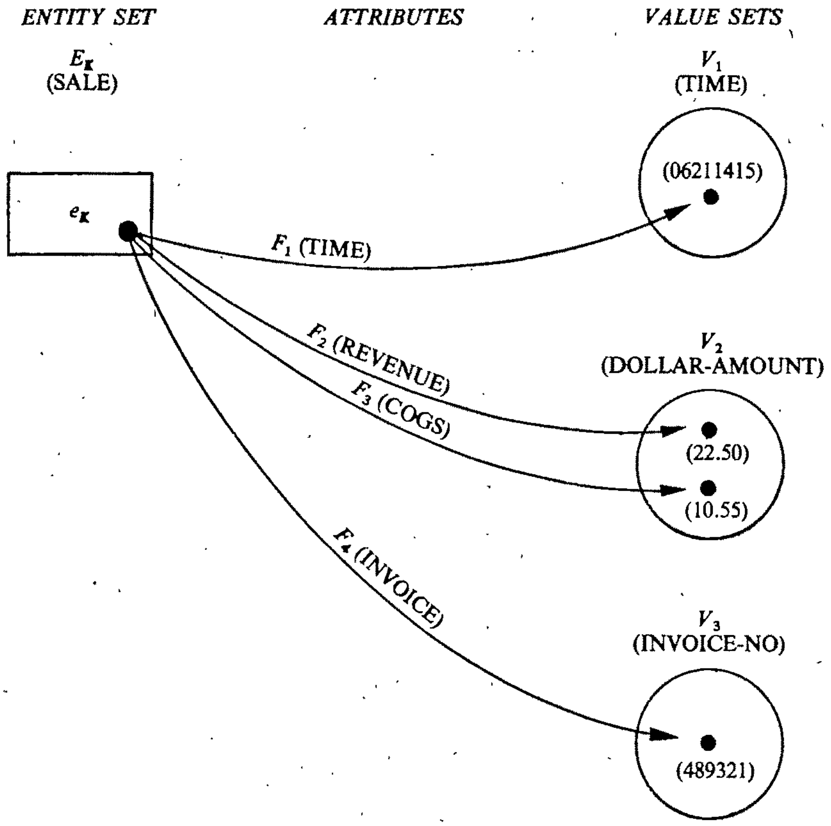
The characteristics of a particular member of an entity/relationship set can be expressed by a listing of *attribute/value* pairs. Examples of these pairs for a specified product in the entity set *INVENTORY* might be "stock#/7432," "acquisition cost/$3.00," and "quantity-on-hand/269."

The first item in each of the pairs above—the *attribute*—is formally defined by Chen [1976, p. 12] "as a function which maps from an entity set or relationship set into a value set." This conceptualization of an attribute as a function is important because it allows the E-R model constructs to develop in a form free of certain unwanted properties such as addition, deletion, and update anomalies [Date, 1977, Ch. 9].

The second item listed in each pair—the *value*—is taken from different *value sets* such as stock numbers, dollar-amounts, and number-of-units. These value sets are analogous to the relational database concept of "domain" described by Everest and Weber [1977] and, in a more limited sense, to the measurement concept of "numerical relational system" described by Mock [1976, Ch. 2]. Indeed, it can be seen that the entire characteristic identification process used in entity-relationship modeling fits in well with Mock's [1976, p. 107] call for em-

FIGURE 8

CHARACTERISTIC MAPPINGS DEFINED ON ENTITY SET *SALE*



phasis on the measurement aspects of data to be used in accounting systems. For those characteristics whose values are numerical, Chen's attribute mappings and value sets correspond exactly to Mock's homomorphic mappings and numerical relational systems.

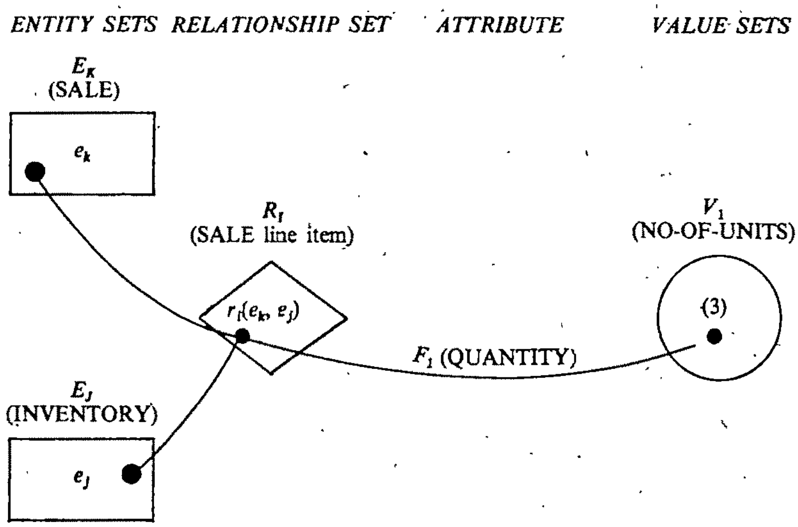
Figures 7 and 8 illustrate some of the characteristic mappings for the entity sets *INVENTORY* and *SALE*. The first function (F_1-STOCK#) in Figure 7 maps a particular element (e_j) in the set *INVENTORY* (that is, one particular product) to its stock number (7432). Likewise, the next four functions (F_2, F_3, F_4, F_5) all map that same element to its various unit costs and unit price. F_6 simply couples a product to its value for quantity-on-hand.

In Figure 8, the first function maps a particular sale event (e_K) that happened on June 21 at 2:15 p.m. to a coded representation of its time occurrence, while F_2, F_3, and F_4 determine other relevant characteristics. The actual mappings for entities in a real enterprise would be obtained via observation or measurement.

The attribute mappings for the relationship set *SALE line item* are given in Figure 9. Although this particular example illustrates a case where the relationship itself possesses a characteristic that cannot be fully identified with either of

FIGURE 9

CHARACTERISTIC MAPPINGS DEFINED ON RELATIONSHIP SET *SALE line item*



the participating entities, it is not necessary for all relationships to have properties of their own. In some cases (one of which will be seen later), the relationship simply specifies an association and possesses no further information content.

Before leaving this section, readers should note the close correspondence between the model as developed so far and the ideas of "events" accounting theorists such as Sorter [1969], Johnson [1970], and Colantoni, Manes, and Whinston [1971]. According to Sorter, "the purpose of accounting is to provide information about relevant economic events that might be useful in a variety of possible decision models" [1969, p. 13]. Even with the limited presentation given to this point, it can be seen that an entity-relationship model accommodates well the things implied by Sorter's statement, such as multidimensional measures (dollars and time), different valuation bases (acquisition cost and replacement cost), and aspects of accounting entities useful in management science modeling (unit carrying cost for economic order quantity models).

Organization of Data Into Entity/Relationship Tables

The final step in the enterprise data modeling process involves (1) designation of primary keys and (2) organization of the constructs identified above (entity sets, relationship sets, value sets, and attributes) into entity/relationship tables.

A primary key (PK) for an entity set (or a relationship set) is simply an identifying characteristic that maps one-to-one with the elements of that entity set, and thus is able to represent those elements in the database. To do this, the identifying characteristic must be both universal—every entity must have it as an attribute—and unique—each entity's value for that characteristic must be different. An example of a PK would be the student number in a university database or the Social Security number in the Internal Revenue Service database. The primary key is not always a single charac-

Figure 10

	PRIMARY KEY			
ATTRIBUTE	TIME	REVENUE	COGS	INVOICE
VALUE SET	TIME	DOLLAR-AMOUNT		INVOICE-NO
ENTITIES (one each row)	06211415	22.50	10.55	489321
	06211418	150.00	90.00	489322
	.	.	.	.
	.	.	.	.
	.	.	.	.

(a) *SALE* entity table

	PRIMARY KEY					
ATTRIBUTE	STOCK #	ACQUISITION COST	REPLACEMENT COST	CARRYING COST	SALE PRICE	QOH
VALUE SET	STOCK #	DOLLAR-AMOUNT				NO-OF-UNITS
ENTITIES (one each row)	7432	3.00	3.50	.75	5.00	269
	8519	.30	.32	.15	1.00	85
	6784	.05	.10	.06	.50	62
	.	.	.	.	.	.
	.	.	.	.	.	.
	.	.	.	.	.	.

(b) *INVENTORY* entity table

teristic; sometimes it is necessary to concatenate several attributes to identify something uniquely. Such is the case for all relationship sets in Chen's model, because he defines their PKs as the combined PKs of their involved entities.

The organization of data into *entity tables* is illustrated in Figure 10. As can be seen, the two tables correspond closely to the mappings shown in Figures 7 and 8. The only real difference is that now a primary key value is allowed to represent each element of the two entity sets, "STOCK#" for the *INVENTORY* entities and "TIME" for the *SALE* entities. This assumes that the company assigns each of its products a different stock number and that each sale event is mapped to a unique time identifier. (Methods for keying events in this manner are discussed in Lamport [1978].)

A relationship table for *SALE line item* is illustrated in Figure 11. Again, the table closely resembles the mappings derived earlier (Figure 9) except that a primary key value, the concatenated PKs of the involved entities, now represents an instance of the relationship. Chen's illustration of relationships in this manner resembles the use of case-grammar models by Roussopoulos and Mylopoulos [1975, p. 147], because it requires specification of "who plays the *roles* (or fills the *cases*)" associated with each relationship. In a complete data model, an entity could fill a number of widely varying roles depending upon the nature of the relationships it participated in.

Figure 12 illustrates two additional

FIGURE 11

RELATIONSHIP TABLE FOR *SALE line item*

	← PRIMARY KEY →			
ENTITY TABLE NAME	SALE	INVENTORY		
ROLE	flow	stock		
ENTITY ATTRIBUTE	TIME	STOCK #	QUANTITY	RELATIONSHIP ATTRIBUTE
VALUE SET	TIME	STOCK #	NO-OF-UNITS	
RELATIONSHIPS (one each row)	06211415	7432	3	
	06211415	8519	4	
	06211415	6784	7	
	06211418	7432	30	
	⋮	⋮	⋮	

FIGURE 12

	← PRIMARY KEY →				
ENTITY TABLE NAME	PURCHASE	INVENTORY			
ROLE	flow	stock			
ENTITY ATTRIBUTE	TIME	STOCK #	QUANTITY	PRICE	RELATIONSHIP ATTRIBUTE
VALUE SET	TIME	STOCK #	NO-OF-UNITS	DOLLAR-AMOUNT	
	⋮	⋮	⋮	⋮	

(a) RELATIONSHIP TABLE FOR *PURCHASE line item*

	← PRIMARY KEY →	
ENTITY TABLE NAME	SALE	CASH-RECEIPT
ROLE	decrement	increment
ENTITY ATTRIBUTE	TIME	TIME
VALUE SET	TIME	TIME
	⋮	⋮

(b) RELATIONSHIP TABLE FOR *SALE payment* relationship tables to be used in later examples. The mappings for these two relationship sets were not shown previously, but the procedures involved would be identical to those used in obtaining the table for *SALE line item* (Figure 11). The table for the set *SALE payment* (Figure 12 (b)) illustrates two additional points. First, it portrays a relationship set which simply specifies a connection without any attributes of its own. Second, its role names are designated in accordance with the causal double-entry reasoning underlying the relationship itself. According to Ijiri [1975, Ch. 5], each occurrence of such a relationship requires specification of the increment and decrement involved. Additionally, the role names in this table would be used to qualify the attributes because the attribute names ("TIME" and "TIME") are not unique.

A total modeling effort for the retail enterprise would involve constructing a table for every set depicted in Figure 6. After these specifications were finished, the entity-relationship view of the enterprise's accounting system would be complete, and the data model would be ready for use with actual database systems. Discussion of the translation process involved in mapping E-R constructs into the specification language of a particular DBMS is beyond the scope of this paper. However, interested readers may consult Chen [1975, pp. 25–34] who describes such processing for relational and network systems.

RECONCILIATION OF TRADITIONAL ACCOUNTING WITH THE NEW DATA MODEL

The data model developed to this point for a small retail enterprise certainly differs radically from the traditional accounting paradigm generated by using a chart of accounts and double-entry bookkeeping. The question now arises, "Can such a model serve the everyday needs of accountants?" The new system is missing certain familiar and financially important items such as accounts-receivable, and its lack of a debit-credit framework might leave some with the uneasy feeling that all comings and goings are not being properly accounted for.

This section will demonstrate that an information system modeled on an entity-relationship basis can indeed accommodate the conventions of traditional accounting. To show this, part of the data model outlined in Figure 6 will be used, specifically two entity sets—*SALE* and *INVENTORY*—and three relationship sets—*SALE line item*, *PURCHASE line item*, and *SALE payment*. Tables representing each of these five sets were presented earlier in Figures 10, 11, and 12.

In the paragraphs below, two types of accounting procedures for the entity-relationship (E-R) model will be described: (1) the derivation of accounts-receivable and (2) the maintenance of perpetual inventory and cost of goods sold. These descriptions will concentrate primarily on the *set* aspects of the E-R constructs and will be very general in nature. In actual practice, the calculations discussed would be performed using the processing language of a particular database system. Readers interested in more specific explanations may consult McCarthy [1978] where a number of detailed accounting computations are done with the relational language SEQUEL [Chamberlin *et al.*, 1976].

At any time during its operations, the total of outstanding receivables for the example enterprise modeled in Figure 6 is equal to the revenue of sale events not yet paid for. This set of sale events is not present explicitly in the system, but it can be obtained easily by subtracting the set of paid-for sales (the elements in the relationship set *SALE payment*) from the set of all sales. After such a set difference operation is performed, accounts-receivable can be calculated by summing the revenue characteristic for all elements of the identified subset.

The relationships between object and event entities were characterized in the E-R modeling process as stock-flow interactions; that is, there existed a stock of some entity such as cash or equipment whose level was affected by flows of events such as cash receipts or equipment acquisitions. Yu [1976, p. 242] discusses the importance to financial reporting of properly accounting for these stock-flow interplays. In traditional systems, their connection is directly accounted for by an entry to the asset (object) account upon the occurrence of a transaction (event), but in an entity-relationship model the interaction must be effected in another way—by defining certain updates to the stock entities that will be invoked upon the occurrence of flow entities. In the case of perpetually maintained inventory for the retail enterprise, these invoked procedures would take place in the following manner. When a purchase occurs in the object system (LEVEL 2 of Figure 1), the data model (LEVEL 3) would have new elements added to the sets *PURCHASE* and *PURCHASE line item*. These additions would then "trigger" the following updates to characteristics of the appropriate element in the set *INVENTORY:*

(1) A new acquisition cost would be set (assuming that the cost scheme is one, such as the moving weighted average method, which can be updated on a perpetual basis);
(2) A new replacement cost would be set (equal to the latest transaction price); and
(3) A new quantity on hand would be calculated.

Mechanisms for implementing these triggered updates are described by Eswaran [1976]. The cost of goods sold characteristic of *SALE* elements would then be calculated at the time of sale using the perpetually maintained acquisition cost of the appropriate inventory entities.

The inventory and cost of goods sold figures calculated above are components of a perfectly consistent database where all elements of the data model (LEVEL 3 in Figure 1) immediately and accurately mirror changes in the object system (LEVEL 2). There are times, however, when certain information is used only at specified intervals, in which case the characteristics involved can be produced by calculation and aggregation only when needed. In the retail accounting model, this stepwise production of information would apply to accounts-receivable and to periodic inventory and cost of goods sold. The process of choosing among the various temporal alternatives in database maintenance depends not so much upon the nature of the characteristic itself but upon its expected decision use. The bases for making such choices involve the issue of "conclusion materialization" and are discussed extensively by Bubenko [1976]. In all cases, the final choice of a consistency level should be "subject to the tradeoff between applications requirements (benefit) and economic feasibility (cost)" [ANSI/X3/SPARC, 1975, p. II-1].

This paper has now considered the fundamental features of Chen's entity-relationship methodology as it applies to the construction and maintenance of an accounting model. Before moving on to a summary, there remains one matter to be considered in the next section: comparison of the E-R accounting model with the relational accounting models of Everest and Weber.

COMPARISON WITH RELATIONAL MODEL

It was mentioned previously that an entity-relationship modeling process could be used as an initial step in actual implementation of many database systems, among them the relational model of Codd [1970]. In fact, the final products of an E-R design process—the entity/relationship tables—are nearly identical in both appearance and mathematical form to Codd relations, and one can see on inspection that the mapping of a Chen model to a relational model is relatively straightforward. There are, however, some important features that differentiate the accounting system developed in this paper from the relational accounting systems developed by Everest and Weber [1977]. These differences stem from design considerations and are explained below.

The relational decomposition or transformation approach [Codd, 1972] to data modeling used by Everest and Weber starts with an arbitrary collection of relations (based upon a chart of accounts, for example) and proceeds, using the notion of functional dependencies, to recast them in a form free of certain undesirable properties such as addition, deletion, and update anomalies [Date, 1977]. In contrast, Chen's approach emphasizes the initial identification of entities and relationships and then proceeds by designating mappings that identify both relevant associations among entities and relevant characteristics of entities and relationships. Use in this paper of the second approach has led to an accounting model superior in two respects.

First, the E-R data model "fits" the object system better. This occurs because its design process begins with *a priori* identification of relevant aspects of the conceptual world rather than with use of a framework based on existing accounting methods. The effect on the Everest and Weber paradigm of using traditional accounting classification schemes is to introduce into the final (fully normalized) data model certain extraneous concepts such as "naming tree" relations and debit/credit account numbers while masking or omitting more essential features such as stock-flow interactions and causal double-entry. The two authors recognized that the use of accounting "artifacts" would cause such problems and suggested possible solutions. However, the use of entity-relationship modeling prevents the problems from occurring at all.

Second, the entity-relationship approach displays more clearly the organization of the object system. It concludes with a data model where each entity/relationship set is represented in a separate table (relation). Chen [1976, pp. 25–29] argues that such an arrangement leads to clearer semantic meaning and accommodates more easily changes in the nature of object system relationships. He also contends that his model clarifies better the nature of dependencies among data, because it differentiates between those mappings used to identify characteristics and those used to identify associations. Chen's modeling process also produces a convenient shorthand—the E-R diagram—that provides a clear overview of the object system and distinguishes explicitly to users the different 1-to-1, 1-to-*n*, and *m*-to-*n* associations.

Finally in the matter of comparing the two approaches, the issue of multivalued dependencies and fourth normal form arises. Recent research (which postdated Everest and Weber's article) by Fagin [1977b] has identified deficiencies in the relational decomposition process and proposed an augmented approach to database design that uses a new semantic object called a "multivalued dependency" [1977b, p. 433]. The final product of this new design process is a "fourth normal form" [Fagin, 1977a] that eliminates from a data model further undesirable aspects of maintenance behavior. The question now is "How do Fagin's new concepts relate to entity-relationship modeling?," and the answer is, "They have already been accounted for." Multivalued dependencies (which are 1-to-*n* mappings) are identified clearly by Chen. More importantly, the storage problems caused by multivalued dependencies arise when a data model attempts to portray two independent relationships in one table [Fagin 1977a, p. 272]. As shown earlier, such a representation would not materialize in entity-relationship modeling.

In summary, the data model developed in this paper represents the accounting universe better than those developed by Everest and Weber. Its development is not encumbered with accounting artifacts, its concepts portray clearly the nature of the accounting object system, and its final form displays none of the undesirable anomalies identified in the normalization literature.

SUMMARY OF MODEL CONCEPTS AND ADVANTAGES

The presentation of an accounting information system based on entity and relationship sets is now complete. The steps necessary to model an object system have been outlined, and specific illustrations of each step for an example enterprise have been given. The paper will conclude by summarizing features of the entity-relationship approach relevant to accounting practice and research.

First, Chen's methodology represents one of the first attempts to construct an enterprise view of data [Chen, 1977], that is, a data model viewed from the perspective of the whole enterprise rather than from the perspective of individual users or particular database management systems. As such, it can be considered a "top-down" approach to system design and a definite aid to logical thought in a database environment. Accountants need a tool like this. With the use of database systems becoming more widespread, they need to be able to view many enterprise schemata in a clear, consistent, and somewhat standardized manner. In this sense, E-R diagrams are analogous to flowcharts; they represent visual aids to be used in understanding the full significance of the data processing operations.

Second, the entity-relationship approach to accounting-database models provides a design framework that can be integrated into any of the database models previously proposed in the literature such as those of Colantoni, Manes, and Whinston [1971], Lieberman and Whinston [1975], and Haseman and Whinston [1976; 1977]. It is especially appropriate for Codd's [1970] relational model, because the transfer from Chen's entity-relationship tables to Codd relations is straightforward. Use of an E-R approach also avoids the drawbacks of decomposition.

Third, the entity-relationship model provides a specific vehicle for the incorporation of measurement concepts and causal double-entry into a single-entry database system. Proponents of these concepts [Mock, 1976 and Ijiri, 1975] have presented them for use in accounting systems, but their ideas do not fit well with journals and ledgers. As seen earlier in the paper, they do adapt well to an E-R model.

Fourth, entity-relationship modeling provides a sound theoretical basis for the expansion of the "events" approach to accounting [Sorter, 1969]. Consideration of a wide range of decision models using multidimensional measures, such as those advocated in two recent AAA reports [1969; 1971], is accomplished easily. Aggregation problems are reduced also because the information in an E-R based system can be stored in disaggregated form and summarized only according to the intent of a particular user.

On the whole, therefore, this paper has shown that the entity-relationship approach to accounting models represents a logical extension to work in the area of accounting information systems. It provides an overview of much of the work done in database systems, and it also offers practical aid to accountants who plan to do work in a database environment.

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A General Decision Model for Cost-Volume-Profit Analysis under Uncertainty

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ABSTRACT: This paper presents a general decision model for cost-volume-profit (C-V-P) analysis which takes into account the crucial elements of random demand and level of production in the determination of actual sales and resulting profits. The purpose of the model construction offered here is to invest C-V-P analysis with realism, and to remove a basic deficiency from the traditional C-V-P model. The general model enables the management to choose the best among alternative products, and to determine, concurrently, optimal production levels in the light of a firm's goals and objectives. Various measures of uncertainty with regard to the behavior of the profit are developed, and their applications are illustrated in numerical examples. Two FORTRAN programs are also supplied to facilitate computation.

THE problem of cost-volume-profit (C-V-P) analysis under uncertainty has received considerable attention in accounting literature since the appearance of Jaedicke and Robichek [1964]. However, most of the works dealing with the stochastic cost-volume-profit analyses were essentially based upon the following traditional relationship (*e.g.*, Jaedicke and Robichek [1964], Buzby [1974], Hilliard and Leitch [1975], and Liao [1975]):

$$T = S(R - V) - F \qquad (1)$$

where

T = Total Profit,
S = Sales Volume in Units,
R = Unit Selling Price,
V = Unit Variable Cost, and
F = Total Fixed Cost.

Various statistical distributions such as normal (Jaedicke and Robichek, [1964]), log normal (Hilliard and Leitch [1975]) and several distribution-free methods such as the Tchebycheff Inequality (Buzby [1974], model sampling and curve-fitting techniques (Liao [1975]) have been employed by these and other authors to analyze the random behavior of profits. The application of these works was largely confined to the assessment of probability distributions of profit and the calculations of their means and stand-

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ard deviations in attempts to identify the "best" choice among alternative products.

There exists, nonetheless, a major deficiency in the traditional C-V-P model mentioned above, which, in turn, critically limits the scope of its usefulness as a tool for management decision making under uncertainty, and casts considerable doubt on the general validity of those results derived from it.

The deficiency lies in the model's failure to recognize the differences between, and the relationships among, sales, demand, and production, as it considers only the sales variable in the equation, and ignores the determining influences that demand and production will have upon the volume of sales. As such, the C-V-P model, when applied to stochastic demand, measures profit by taking into account only the portion of the variable costs that are attributable to the units sold; it ignores the remaining portion of the variable costs which are associated with unsold items. This approach leads to an overestimation of the actual profit whenever production exceeds demand, and future demand for the unsold units ceases to exist. For instance, whenever production exceeds demand, the traditional model will overestimate the profit from the sale of any goods which cannot be inventoried, such as perishable goods, or goods for which the demand lasts for only a certain period, such as style goods, or goods that become obsolete rapidly. If the demand for these items is a random variable, then overproduction becomes probable, and, as such, the variable costs that are associated with the unsold units should be taken into account in the profit equation. This occurs because there is no future market for the leftovers which will have to be disposed of at a loss.

For the convenience of analysis, assume that the salvage value is zero for any leftovers. It is true that when demand is known with certainty or is predictable, there is no need to distinguish sales from production and demand, since in this case the three elements are reduced to the same quantity. It is also true that when the demand size is infinite, and when items can be inventoried indefinitely, there will be no need to consider the variable costs of the currently unsold items, since they will be sold eventually. It should be emphasized, however, that when demand varies stochastically, and when there is no future market for any unsold units, then actual sales will be determined by the relative sizes of production and demand. Actual sales will be the same as demand if demand does not exceed the production quantity, and actual sales will be equal to production quantity if production quantity does not exceed the demand. Treating sales, S, as an independent variable and disregarding what actually determines the sales, represents an oversimplification of reality. The result will be an overestimation of the realized profit.

In view of these discussions, it is clear that the traditional C-V-P model expressed in Equation (1) would be appropriate only for profit analysis either under the condition of known or predictable demand, or under the condition that the size of demand is unlimited and any unsold units can be inventoried and eventually will be sold. It is incorrect and misleading, therefore, to use the same model for measuring profit when demand is a random variable and when the future demand for unsold units does not exist.

The purpose of this research is to modify the traditional C-V-P model to broaden the scope of its applicability by presenting a general stochastic C-V-P relationship. The modified model would consider explicitly both the random demand and the level of production in the determination of actual sales and in the derivation of the distributional forms of the profit. A salient feature of this approach is that the results developed from the new model can be employed not only to describe the characteristics and measure the degree of uncertainty concerning the random behavior of profit, but, more importantly, it can also be used to assist management in making optimal decisions for the achievement of their goals and objectives in the face of such uncertainty.

The remainder of this paper will be an endeavor: (A) to propose a general stochastic C-V-P model which lends itself to the derivation of the general profit distribution along with its expected value and standard deviation, all of which are functions of the level of production; (B) to apply the general formulas, derived from (A), to the case where demand has a normal distribution from which the related profit distribution, the expected value and the standard deviation, as well as the probability of attaining at least a certain profit level are further obtained; and (C) to provide several numerical examples to illustrate various applications of the results developed.

THE GENERAL STOCHASTIC COST-VOLUME-PROFIT MODEL

This section is designed to present a more realistic C-V-P relationship that separates sales from production and demand and which properly places each one of them in their respective roles. To facilitate the model construction, the following assumptions are considered: (A) whenever production exceeds demand, future demand for any unsold units ceases to exist (goods of this nature include perishable, or style goods, or goods subject to rapid obsolescence, among others); and (B) any unsold units will be disposed of with no salvage value.

Now, let D denote the demand variable, and Q the production quantity. Then the level of actual sales, S, can be expressed as

$$S = \begin{cases} Q, \text{if } D \geq q \\ D, \text{if } D < q. \end{cases} \tag{2}$$

Combining (1) and (2), and taking into account the total variable cost, VQ, as well as the relative magnitude of demand and production, one obtains the following general C-V-P model:

$$T = \begin{cases} Q(R - V) - F, \text{if } D \geq Q \\ RD - VQ - F, \text{if } D < Q. \end{cases} \tag{3}$$

where:

T = total profit,
R = unit selling price,
V = unit variable cost, and
F = total fixed cost.

Note that the total variable cost, VQ, is included in both cases of (3) in order to reflect fully the consequences of overproduction, as discussed above. It can be easily seen that when demand is known in advance, or is predictable, then $Q = D = S$, and thus Equation (3) is reduced immediately to (1). Similarly, if items can be inventoried and whatever quantity that is produced can be sold (*i.e.*, unlimited demand), then there is no need to be concerned about the size of demand, D; and, therefore, the second part of (3) would no longer exist, Equation (3) being again reduced to (1). Consequently, the traditional relationship expressed in (1) is only a special case of (3).

A. *The Derivation of General Probability Distribution of Profit.*

Assume that D and T are the only random variables in (3); R, V, and F are known constants; and the value of Q is to be determined in each case. Let $f(D)$

and $g(T)$ denote, respectively, the probability distribution of demand and of profit; $D_{\max}$ and $D_{\min}$ represent, respectively, the upper and lower bounds of D.

According to (3), T could take on either the value of $(R-V)Q-F$ or $RD-VQ-F$ depending on whether $D \geq Q$ or $D<Q$. As D is the only random variable, the first set of values for T is simply a constant whenever $D \geq Q$, while the second set of T values is a linear function of D if $D<Q$. Since the probability of T taking on the value of $(R-V)Q-F$ is identical to the probability that $D \geq Q$, it then follows that the probability that $T=(R-V)Q-F$ is

$$\int_{Q}^{D_{\max}} f(D)dD. \tag{4}$$

As for the second set of values, T could take on any value between $RD_{\min}-VQ-F$ and $(R-V)Q-F$ as D varies from $D_{\min}$ to Q. Since T is a linear transformation of D, the probability distribution of T is given by Hogg and Craig [1965, p. 117]:

$$f\left(\frac{T+VQ+F}{R}\right)\left|\frac{dD}{dT}\right| \tag{5}$$

where, from (3),

$$D=\frac{1}{R}(T+VQ+F) \tag{6}$$

and

$$\left|\frac{dD}{dT}\right|$$

is the absolute value of the total derivative of D with respect to T. Thus,

$$\left|\frac{dD}{dT}\right|=\frac{1}{R}. \tag{7}$$

In summary, the complete general probability distribution of profit, $g(T)$, is thus given by:

$$g(T)=\begin{cases}\displaystyle\int_{Q}^{D_{\max}} f(D)dD, & \text{if } T=(R-V)Q-F\\ \displaystyle\frac{1}{R}f\left(\frac{T+VQ+F}{R}\right), & \text{if } RD_{\min}-VQ-F \leq T<(R-V)Q-F.\end{cases} \tag{8}$$

Equation (8) reveals that the shape of the probability distribution of profit now depends, as it should, on both the distributional form of the demand variable and the planned production quantity, rather than on just actual sales alone.

It can be shown that $g(T)$ is a probability distribution because: (A) $g(T) \geq 0$, since $f(D) \geq 0$ and $R \geq 0$; and (B) the total probability of $g(T)$ is equal to 1, the proof of which is given in the Appendix (Part D).

B. *The Expected Value and Variance of Profit.*

This section outlines the general formulas for the mean and standard deviation of profits with any continuous demand distribution $f(D)$ and any value of Q. The following notations are used:

$E(T)$ = the expected value (mean) of profit
$\mathrm{Var}(T)$ = the variance of profit
$\mu_D = E(D)$ = the expected value (mean) of demand
$\sigma_D^2 = \mathrm{Var}(D)$ = the variance of demand
$T_{\max}$ and $T_{\min}$ = the maximum and minimum values of profit

By the definitions of mean and variance, the following general formulas for the mean and variance of profit are obtained from (8):

$$E(T)=R\mu_D-\left[R\int_Q^{D_{\max}}(D-Q)f(D)dD+VQ\right]-F \tag{9}$$

$$f_N(D)=\frac{1}{\sigma_D\sqrt{2\Pi}}e^{-(D-\mu_D)^2/2\sigma_D^2},\quad -\infty<D<\infty. \tag{11}$$

From (8) and (11) one immediately obtains the profit distribution, which is:

$$g(T)=\begin{cases}\displaystyle\int_Q^{\infty}f_N(D)dD, & \text{if } T=(R-V)Q-F\\[2ex] \displaystyle\frac{1}{R}f_N\!\left(\frac{T+VQ+F}{R}\right) & \text{if } -\infty<T<(R-V)Q-F.\end{cases} \tag{12}$$

and,

$$\begin{aligned}\mathrm{Var}(T)&=E[T-E(T)]^2\\ &=R^2(\sigma_D^2+\mu_D^2)\\ &\quad+R^2\int_Q^{D_{\max}}(Q^2-D^2)f(D)dD\\ &\quad+2R(VQ+F)\int_Q^{D_{\max}}(D-Q)\\ &\quad\cdot f(D)dD+(VQ+F)^2\\ &\quad-2R\mu_D(VQ+F)-[E(T)]^2 \end{aligned} \tag{10}$$

The mathematical derivations of (9) and 10 are furnished in the Appendix (Part A).

THE USE OF GENERAL RESULTS FOR NORMAL DEMAND

The general results obtained in the previous section are applicable to any continuous probability distribution of demand. Since the normal distribution has been widely used in C-V-P analysis,[1] it will also be used here to illustrate the general results. Efforts will be made here to derive the probability distribution of profit, its mean and variance, as well as the probability of achieving at least a certain amount of profit.

A. *The Probability Distribution of Profit When Demand is Normally Distributed.*

If demand is normally distributed, then the demand distribution is represented by (11).

Since μ_D and σ_D are given, the value of the integral

$$\int_Q^{\infty}f_N(D)dD,$$

above, can be determined from a normal table; the value of

$$\frac{1}{R}f_N\!\left(\frac{T+VQ+F}{R}\right)$$

can be also obtained from a normal table for any T within the specified range, since

$$f_N\!\left(\frac{T+VQ+F}{R}\right)$$

is a normal ordinate at the point D, where

$$D=\frac{T+VQ+F}{R}.$$

B. *The Mean and Variance of Profit When Demand is Normally Distributed*

Substituting $f_N(D)$ of (11) for $f(D)$ in (9) and (10) yields, respectively, the mean and variance as follows: (The derivations of (13) and (14) are given in the Appendix (Part B).)

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[1] Note that one apparent drawback of having a demand variable assume a normal distribution is that it may take on negative values. However, if the mean, μ, and standard deviation, σ, of a demand variable are such that the quantities $\mu\pm3\sigma$ are ≥0, then a normal distribution could be satisfactorily used to approximate such a variable. This is because, for any normal distribution, there is about a 0.9974 chance that the values of the variable will be within the range $\mu\pm3\sigma$; and, therefore, the chance for the variable to take on any negative values would be very small. This being the case, the use of normal distribution is justified.

$$E(T)=R\mu_D-[R\sigma_D L_N(Z)+VQ]-F \quad (13)$$

and,

$$\begin{aligned}\mathrm{Var}(T)=R^2(\sigma_D^2+\mu_D^2)&\\ &+R^2\Bigg[\sigma_D^2 Z^2\int_Z^\infty f_N'(\theta)d\theta\\ &-2\mu_D\sigma_D L_N(Z)-\tfrac{1}{2}\sigma_D^2\\ &\cdot\left\{1-\int_0^{Z^2}\frac{1}{(1/2)!2^{3/2}}t^{1/2}e^{-t/2}dt\right\}\Bigg]\\ &+2R(VQ+F)\sigma_D L_N(Z)\\ &+(VQ+F)^2\\ &-2\mu_D R(VQ+F)-[E(T)]^2 \quad (14)\end{aligned}$$

where

$$Z=(Q-\mu_D)/\sigma_D \quad (15)$$

and,

$$L_N(Z)=\int_Z^\infty(\theta-Z)f_N'(\theta)d\theta. \quad (16)$$

$L_N(Z)$, defined by (16), is the unit normal loss integral, and its values can be obtained from tables (*e.g.*, Raiffa and Schlaifer [1961, p. 356]); $f_N'(\theta)$ is the unit normal density, and the integral inside the braces is an incomplete gamma function [Mood and Graybill, 1963, p. 128], the values of which have been tabulated [Pearson, 1922].

Note that the expected value in (13) is a function of Q, and it is simple to locate the value of Q such that the expected profit is maximized. To do this, we differentiate $E(T)$ in (13) with respect to Q, using Leibnitz's rule [Spiegel, 1963, p. 163] and set the first derivative to zero to yield

$$\int_Q^\infty f_N(D)dD=\frac{V}{R} \quad (17)$$

from which the optimal value of Q can be determined using the normal table.

C. *The Probability that Profit will be at Least Equal to a Given Amount.*

Aside from the mean and variance, another quantity of interest that can be found from the general model is the probability that profit will be at least equal to a given level, say G, but less than $(R-V)\cdot Q-F$, which is the upper bound of the profit. In notation, this probability is expressed by

$$P(G\le T<(R-V)Q-F). \quad (18)$$

As will be seen in the next section, this probability can serve as a valuable tool to aid management in making decisions. Given $g(T)$ in (12), (18) can be further expressed as

$$\begin{aligned}P(G\le T<(R-V)Q-F)&\\ &=\int_G^{(R-V)Q-F}g(T)dt\\ &\int_{(G+VQ+F)/R}^\infty f_N(D)dD-\int_Q^\infty f_N(D)dD\\ &=\int_{(G+VQ+F)/R}^Q f_N(D)dD. \quad (19)\end{aligned}$$

Note that (19) is a function of Q only, given G, V, F, and R and $f_N(D)$. It should provide very useful information to the decision maker if the value of Q that maximizes the probability of making at least G can be ascertained. It will be shown in the Appendix (Part C) that this special value of Q is the one in

$$Q=\frac{-b\pm\sqrt{b^2-4ac}}{2a} \quad (20)$$

that also satisfies the condition

$$Q>\frac{(G+F)V-\mu_D R(V-R)}{R^2-V^2} \quad (21)$$

where

$$a = V^2 - R^2$$

$$b = 2(G + F)V - 2\mu_D R(V - R)$$

and

$$c = (G + F)^2 - 2R^2\sigma_D^2(\ln V - \ln R) - 2\mu_D R(G + F). \quad (22)$$

Now, in order to guarantee that such a Q exists, the following condition

$$b^2 - 4ac > 0 \quad (23)$$

must be satisfied.

When (23) holds, then the value of Q obtained from

$$Q = \frac{-b - \sqrt{b^2 - 4ac}}{2a} \quad (24)$$

will be a positive number and will also satisfy (21); and therefore the existence of such a solution for Q is guaranteed by (24) under the condition of (23).

A descriptive summary of several of the key equations derived in this and in the preceding sections is provided in the Appendix (Part E).

THE APPLICATION OF THE GENERAL C-V-P MODEL

Prior to presenting several numerical examples to illustrate the application of the results developed from the model, a review of the structure of the model and its solutions is in order.

The proposed C-V-P model in (3) is restated here as (25):

$$T = \begin{cases} Q(R - V) - F, \text{if } D \geq Q \\ RD - VQ - F, \text{if } D < Q \end{cases} \quad (25)$$

where T denotes total profit, Q is the production quantity, D is the demand variable, and R, V, and F represent unit selling price, unit variable cost, and total fixed cost, respectively. As pointed out earlier, this model is more general than the traditional one given in (1) because (1) is a special case of (25). Based on (25), the probability distribution of profit for any continuous demand variable, as well as its mean and variance, were obtained, which led to the derivations of the probability distribution of profit for the normally distributed demand variable together with its mean and variance. On the assumption that demand has a normal distribution, these results were further utilized to find (A) the optimal production quantity that maximizes the expected profit, and (B) the optimal production quantity that maximizes the probability of making at least a certain amount of profit. It is obvious, therefore, that the results developed from the new model can be employed not only to describe the characteristics and measure the degree of uncertainty regarding the random behavior of profit, but, more importantly, it can also be used to determine optimal decisions in the face of such uncertainty. As a tool for profit planning, the solutions from the model enable the management to conveniently answer not only the question, "Which product should the firm select?", but also the question, "How much of the selected product should the firm manufacture?", in the pursuit of various goals and objectives. This capacity to choose the best product among alternatives and to determine concurrently the optimal production level in the light of the firm's goals and objectives would certainly add a new dimension to the C-V-P analysis.

Two examples will be presented here to illustrate various applications of the proposed C-V-P model. The first example deals with a single production decision problem where the break-even point, mean, and standard deviation of profit will be calculated, among others. The second example is concerned with the selection of the most desirable product for marketing among several mutually-exclusive products. In both cases, several decision situations will be considered and both the maximization of expected profit and the maximization of the probability of making at least a certain level of profit will be used as alternative management objectives.

Example 1: Single-Product Decision Problem. Suppose that a company has to decide whether a new product being developed should be marketed. The annual demand has been assumed to be approximately normally distributed with a mean (μ_D) of 4000 units and a standard deviation (σ_D) of 500 units. Sales price (R) and variable cost (V) are \$1,000 and \$308, respectively. Annual fixed cost (F) amounts to \$700,000. With this information, three separate decision situations related to this problem will be considered below.

Decision Situation A. Should the new product be marketed? To decide whether it would be profitable to market the new product, one needs to know the value of the break-even point (B.E.). Now,

$$\text{B.E.} = \frac{\text{Fixed Cost}}{\text{unit selling price} - \text{variabre cost}} = \frac{\$700{,}000}{\$1000 - \$308} = 1012 \text{ units.}$$

Since the profit is a linear function of Q, it is only necessary to compare the average demand with the break-even point to determine the profitability of the new product [Winkler, 1972, pp. 348–353]. Because the average demand ($\mu_D = 4000$) is greater than the break-even point, the new product should be marketed.

Decision Situation B. If the firm's objective is to maximize the expected profit, then what is the optimal quantity that should be made available for sales annually in order to achieve this objective?

The traditional C-V-P model shown in (1) is incapable of answering such a question. However, a question such as this one can be readily answered using Equation (17). From (17).

$$\int_Q^\infty f_N(D)dD = \frac{V}{R} = \frac{\$308}{\$1000} = 0.308 \quad (26)$$

which corresponds approximately to the Z-value of 0.50 in the unit normal table; thus

$$Z = \frac{Q - \mu_D}{\sigma_D} = 0.50$$

and

$$Q = \mu_D + 0.50\sigma_D = 4000 + 0.50\,(500) = 4250 \text{ units.}$$

Thus, 4250 units of the new product should be made available for sales annually if the expected profit is to be maximized. Given $Q = 4250$ units, the corresponding maximum expected profit, along with its standard deviation, are found from Equations (13) and (14).

In order to compute $E(T)$ and $\text{Var}(T)$, one needs the values of $L_N(Z)$,

$$\int_Z^\infty f_N'(\theta)d\theta,$$

and the incomplete gamma function inside the braces of Equation (14). Now, since

$$Z = \frac{Q - \mu_D}{\sigma_D} = .5,$$

we have $L_N(Z) = L_N(0.5) = 0.1978$ [Winkler, 1972, p. 516–517],

$$\int_Z^\infty f_N'(\theta)d\theta = 0.308, \text{ from (26)},$$

and

$$\int_0^{Z^2} \frac{1}{(1/2)!2^{3/2}}\, t^{1/2} e^{-t/2} dt = \int_0^{Z^2/2} \frac{1}{(1/2)!}\, x^{1/2} e^{-x} dx,$$

letting

$$t = 2x \doteq 0.0299738$$

which was obtained from the table of incomplete gamma function [Pearson, 1922, p. 21]. Also see p. viii of the same reference for the special form of the incomplete gamma function used by Pearson.

Given these values and others, the expected profit and the variance associated with the optimal Q, 4250, are calculated as follow:

$$\begin{aligned}E(T) &= 1000(4000) - [1000(500)(0.1978) \\ &\quad + (308)(4250)] - 700{,}000 \\ &= \$1{,}892{,}100,\end{aligned}$$

and

$$\begin{aligned}\mathrm{Var}(T) &= (1000^2)(500^2 + 400^2) \\ &\quad + (1000^2)[(500)^2(0.5)^2(0.308) \\ &\quad - 2(4000)(500)(0.1978) \\ &\quad - \tfrac{1}{2}(500)^2(1 - 0.0299738)] \\ &\quad + 2(1000)[308(4250) \\ &\quad + 700{,}000](500)(0.1978) \\ &\quad + [(30)(4250) + 700{,}000]^2 \\ &\quad - 2(400)(1000)[308(4250) \\ &\quad + 700{,}000] - (1892100)^2 \\ &= 1.3821551 \times 10^{11}.\end{aligned}$$

Thus, the standard deviation of the profit, $\mathrm{Var}(T)^{1/2}$, for $Q = 4250$ is 371773.47. A FORTRAN program that computes $E(T)$, $\mathrm{Var}(T)^{1/2}$, and the probability that the profit will be at least T but less than its upper bound, for any range of Q values, is provided in Appendix (Part G).

Decision Situation C. Instead of maximizing expected profit, some risk-averting managers may find it more attractive and secure to adopt a strategy that would assure them the highest possible chance for achieving at least a given profit level. As noted in the previous section, the general C-V-P model, unlike its counterpart in (1), is also capable of aiding management in developing such a strategy for its profit plans.

Suppose that the management in question considered one million dollars a very satisfactory profit margin per annum and wanted to know what should be the production quantity so that the chance of achieving at least this profit margin would be maximized. From (19) to (22), and given the values of R, V, F, μ_D and σ_D, it is found that the optimal Q should be set at 5066 units. From (19), the maximum probability associated with this Q is 0.9140. The required computations are given below:

$$\begin{aligned}a &= 308^2 - 1000^2 = -905{,}136 \\ b &= 2(1{,}000{,}000 + 700{,}000)(308) \\ &\quad - 2(4000)(1000)(308 - 1000) \\ &= 65832 \times 10^5 \\ c &= (1{,}000{,}000 + 700{,}000)^2 \\ &\quad - 2(1000)^2(500)^2(\ln 308 - \ln 1000) \\ &\quad - 2(4000)(1000)(1{,}000{,}000 + 700{,}000) \\ &= -1.021172 \times 10^{13}.\end{aligned}$$

From (20), and using the values of a, b, c just obtained above, the two roots of Q are given by

$$Q = \frac{-b + \sqrt{b^2 - 4ac}}{2a} = 2207 \text{ units},$$

and

$$Q = \frac{-b - \sqrt{b^2 - 4ac}}{2a} = 5066 \text{ units}.$$

However, (21) requires that the optimal value of Q must also satisfy the condition that

$$Q>\frac{(G+F)V-\mu_D R(V-R)}{R^2-V^2}=\frac{(308)(1{,}000{,}000+700{,}000)-(4000)(1000)(308-1000)}{1000^2-308^2}$$

$$=3637 \text{ units};$$

that is, the optimal value of Q must be greater than 3637 units. Consequently, the optimal production quantity, Q, should be 5066 units, at which the probability of making at least \$1 million of profit is maximized. From (19), the probability that corresponds to 5066 units of Q is

$$\int_{(G+VQ+F)/R}^{Q} f_N(D)dD=\int_{3260}^{5066} f_N(D)dD$$

$$=\int_{-1.48}^{2.13} f_N'(\theta)d\theta=0.9140,$$

where $f_N'(\theta)$ is unit normal density function. Thus, the firm should produce 5066 units in order to maximize its chance of making at least \$1 million of profit, and such a chance equals 0.9140.

A FORTRAN program for computing optimal Q which maximizes the probability of making at least a given level of profit is provided in the Appendix (Part F). Having obtained the Q value, the computer program given in Appendix (Part G) can be used to determine such a probability along with the corresponding mean and standard deviation of the profit.

Example 2: Mutually-Exclusive Products Selection Problem. Suppose that the president of a manufacturing company has to decide which one of the three mutually-exclusive products just developed (1, 2, and 3) should be selected for marketing, and what should be the optimal production quantity for the selected product. Suppose further that according to a reliable estimate the annual demand for each of the three products can be approximated by a normal distribution. Data concerning the mean and standard deviation of the demand for each product, variable and fixed costs, and the break-even points is given in Table 1. As in Example 1, the solution of this problem will be discussed under several decision situations, and two different management objectives will be used in determining the optimal production quantities.

Decision Situation A. Is there any one, among the three products, that would be profitable to market? To determine the profitability of a product, one has only to compare, as mentioned in Example 1, the average demand for the product with its break-even point. Since the annual average demand is greater than the break-even point in each case, as indicated in Table 1, all three products are profitable to market.

Decision Situation B. If management desires to maximize the expected profit, which product should the firm select?

TABLE 1

DATA ABOUT THE THREE PRODUCTS IN EXAMPLE 2

Product	R	V	F	μ_D	σ_D	*Break-even Point*
1	\$1200	\$ 500	\$ 490,000	5000 units	600 units	700 units
2	2500	1000	1,200,000	5000	1500	800
3	2500	1000	1,200,000	4000	500	800

What is the optimal production quantity for the selected product? In order to answer these questions, one should first use Equation (17) to locate the optimal production quantity and then use the optimal production quantity obtained to compute the maximum expected profit from Equation (13). These calculations must be done for each product, and then that product for which the expected profit is the largest would be selected. The results of computations are given below.

(i) For Product 1: Given the data in Table 1, and from Equation (17), one obtains

$$\int_Q^\infty f_N(D)dD = \frac{V}{R} = \frac{500}{1200} = 0.4167$$

which corresponds to the Z-value of 0.21. Thus,

$$\frac{Q-\mu_D}{\sigma_D} = \frac{Q-5000}{600} = 0.21$$

and $Q=\mu_D+0.21\sigma_D=5000+0.21(600)=5126$ units, which is the optimal production quantity for product 1, since it maximizes the expected profit.

Substituting 5126 for Q in Equation (13) yields the maximum expected profit for product 1 as

$$\begin{aligned} E(T) &= R\mu_D - [R\sigma_D L_N(Z) + VQ] - F \\ &= 1200(5000) - [1200(600)L_N(0.21) \\ &\quad + 500(5126)] - 490{,}000 \\ &= \$2{,}729{,}056, \end{aligned}$$

since $L_N(0.21)=0.3027$ (from Winkler [1972, pp. 516–517]).

(ii) For Product 2: Similarly, using Equations (17) and (13), one determines the optimal production quantity for product 2 to be 5380 units and the corresponding maximum expected profit to be $4,851,200.

(iii) For Product 3: In the same manner as in (i) and (ii), the optimal production quantity and the corresponding maximum expected profit are found to be 4127 units and $4,317,073, respectively.

Since product 2 yields the highest expected profit among the three, it should be selected for marketing, and the optimal production quantity for product 2 is 5380 units.

Decision Situation C. Assume that the firm is more concerned with the risk involved in achieving a satisfactory profit level than the size of the expected profit. Which product, then, should the firm select, and how many units of the selected product should the firm manufacture, if it intends to maximize the chance of making at least $2 million of profit?

This question can be answered by referring to Equations (19), (20), (21), and (22) from which the production quantity that maximizes such probability as well as the probability itself are obtained. Again, this should be done for each product, and then that product, for which the probability of making at least $2 million of profit is the largest, would be selected. Since the computations involved here are the same as those presented in Decision Situation C of Example 1, only the final results are summarized for the purpose of comparison:

(i) For Product 1: It was found that the probability of making at least $2 million of profit is maximized when the production quantity is set at 5917 units, and the maximum probability is equal to 0.7164.

(ii) For Product 2: It was found that the probability of making at least $2 million of profit is maximized when the production quantity is set at 7197 units, and the corresponding maximum probability is 0.6402.

(iii) For Product 3: Similarly, the probability of making at least $2 million of profit is maximized when the production quantity is 4990 units, and the maximum probability is 0.9026.

Since product 3 has the highest probability, product 3 should be selected, with the production quantity set at 4990 units.

SUMMARY AND CONCLUSION

Most of the cost-volume-profit analyses under uncertainty are based upon a traditional relationship that fails to take into account the crucial elements of random demand and level of production in their determination of actual sales, and, as such, profit will be overestimated whenever production exceeds demand and when future demand for unsold units ceases to exist. This deficiency has critically limited the scope of the usefulness of the model and has left the general validity of its derived results in doubt. This paper has presented a general C-V-P model which treats the traditional model as a special case, eliminates its deficiency and brings additional realism into the analysis. Two FORTRAN programs are supplied to facilitate the various computations. The results developed from the general C-V-P model now serve not only as a profit measuring and predicting tool to assist management in selecting a product among alternatives, but also as an optimization device through which the optimal level of production for the selected product can be concurrently determined. The model's capability to choose the most desirable product among alternatives and to provide, at the same time, optimal production levels for the chosen product in accordance with a firm's goals and objectives certainly adds a new dimension to the C-V-P analysis. The features incorporated in the general model developed here ensure its usefulness in management decision making under uncertainty.

APPENDIX

This Appendix is divided into seven parts. Parts A through D present in detail the proofs and explanations of various formulae developed in the text; Part E provides a descriptive summary of several key equations derived in the paper; Parts F and G introduce two FORTRAN programs. The first program is designed to perform various computations to determine the optimal production quantity that maximizes the probability of making a minimum of $G profit. The second program calculates the mean and standard deviation of profit, as well as the probability that profit will be at least $T for various production quantities under the assumption that the demand is normally distributed.

A. *The Derivations of General Mean and Variance of Profit.*

By definition,

$$E(T) = [(R-V)Q-F]\int_{Q}^{D_{\max}} f(D)dD + \int_{RD_{\min}-VQ-F}^{(R-V)Q-F} \frac{T}{R} f\left(\frac{T+VQ+F}{R}\right)dT$$

$$= [(R-V)Q-F]\int_{Q}^{D_{\max}} f(D)dD + \int_{D_{\min}}^{Q} (RD-VQ-F)f(D)dD$$

since

$$d = \frac{1}{R}(T+VQ+F),$$

we get $dT=RdD$, and also when T varies from $RD_{\min}-VQ-F$ to $(R-V)Q-F$, D varies from $D_{\min}$ to Q.

$$= [(R-V)Q-F]\int_{Q}^{D_{\max}} f(D)dD + R\left[\int_{D_{\min}}^{D_{\max}} Df(D)dD - \int_{Q}^{D_{\max}} Df(D)dD\right]$$

$$-(VQ+F)\int_{D_{\min}}^{Q} f(D)dD$$

$$= R\mu_D - \left(R\int_{Q}^{D_{\max}}(D-Q)f(D)dD + VQ\right) - F. \tag{A-1}$$

This completes the proof for the general mean. Thus, (A-1) gives the expected value of profit for any continuous distribution of demand. By definition,

$$\mathrm{Var}(T)=E[T-E(T)]^2=E(T^2)-[E(T)]^2$$

$$=[(R-V)Q-F]^2\int_{Q}^{D_{\max}} f(D)dD+\int_{RD_{\min}-VQ-F}^{(R-V)Q-F} T^2 g(T)dT-[E(T)]^2$$

$$=[(R-V)Q-F]^2\int_{Q}^{\infty} f(D)dD+\int_{D_{\min}}^{Q}(RD-VQ-F)^2 f(D)dD-[E(T)]^2$$

(Since $T=RD-VQ-F$ and by change of variable from T to D.)

$$=(RQ)^2\int_{Q}^{D_{\max}} f(D)dD-2RQ(VQ+F)\int_{Q}^{D_{\max}} f(D)dD+(VQ+F)^2\int_{Q}^{D_{\max}} f(D)dD$$

$$+R^2\int_{D_{\min}}^{Q} D^2 f(D)dD-2R(VQ+F)\int_{D_{\min}}^{Q} Df(D)dD+(VQ+F)^2\int_{D_{\min}}^{Q} f(D)dD$$

$$-[E(T)]^2$$

$$=(RQ)^2\int_{Q}^{D_{\max}} f(D)dD-2RQ(VQ+F)\int_{Q}^{D_{\max}} f(D)dD+(VQ+F)^2$$

$$+R^2\left(\int_{D_{\min}}^{D_{\max}} D^2 f(D)dD-\int_{Q}^{\infty} D^2 f(D)dD\right)-2R(VQ+F)\left(\int_{D_{\min}}^{D_{\max}} Df(D)dD\right.$$

$$\left.-\int_{Q}^{D_{\max}} Df(D)dD\right)-[E(T)]^2$$

$$=R^2(\sigma_D^2+\mu_D^2)+R^2\int_{Q}^{D_{\max}}(Q^2-D^2)f(D)dD+2R(VQ+F)\int_{Q}^{D_{\max}}(D-Q)f(D)dD$$

$$+(VQ+F)^2-2R\mu_D(VQ+F)-[E(T)]^2. \tag{A-2}$$

$$\left(\text{Since} \int_{D_{\min}}^{D_{\max}} D^2 f(D)dD=E(D^2)=\sigma_D^2+\mu_D^2.\right)$$

This completes the proof for the general variance. Thus, (A-2) represents the variance of profit for any continuous distribution of demand.

B. *The Derivations of Mean and Variance of Profit when Demand is Normally Distributed.*

Since

$$\int_Q^{\infty}(D-Q)f_N(D)dD=\sigma_D\int_Z^{\infty}(\theta-Z)f_N'(\theta)d\theta=\sigma_D L_N(Z)$$

where

$$Z=\frac{Q-\mu_D}{\sigma_D},$$

[Winkler, 1972, pp. 516–518], and $f_N'(\theta)$ is unit normal density, from (A-1) one obtains

$$E(T)=R\mu_D-[R\sigma_D L_N(Z)+VQ]-F. \qquad \text{(A-3)}$$

This completes the proof for the mean of profit when $f(D)$ is a normal distribution. When $f(D)$ is a normal distribution,

$$\int_Q^{D_{\max}}(Q^2-D^2)f(D)dD=\int_Q^{D_{\max}}(Q^2-D^2)f_N(D)dD$$

$$=\int_Z^{\infty}[(\sigma_D Z+\mu_D)^2-(\sigma_D y+\mu_D)^2]f_N'(y)dy$$

(by a change of variable from D to

$$y=\frac{D-\mu_D}{\sigma_D};$$

and where

$$Z=\frac{Q-\mu_D}{\sigma_D},$$

$f_N'(y)$ is the unit normal density.)

$$=\sigma_D^2Z^2\int_Z^{\infty}f_N'(y)dy-\sigma_D^2\int_Z^{\infty}y^2f_N'(y)dy-2\mu_D\sigma_D\int_Z^{\infty}(y-Z)f_N'(y)dy$$

$$=\sigma_D^2Z^2\int_Z^{\infty}f_N'(y)dy-\sigma_D^2\int_Z^{\infty}y^2f_N'(y)dy-2\mu_D\sigma_D L_N(Z). \qquad \text{(A-4)}$$

Furthermore, in (A-4)

$$\int_Z^{\infty}y^2f_N'(y)dy=\frac{1}{\sqrt{2\pi}}\int_Z^{\infty}y^2e^{-(1/2)y^2}dy=\frac{1}{\sqrt{2\pi}}\int_{Z^2}^{\infty}te^{-(1/2)t}d(t^{1/2}),$$

Where $t=y^2$, and $y=t^{1/2}$ and so when $y=Z$, $t=Z^2$.

$$=\frac{1}{2}\int_{Z^2}^{\infty}\frac{1}{\left(\frac{1}{2}\right)!2^{3/2}}t^{1/2}e^{-t/2}dt=\frac{1}{2}\left(1-\int_0^{Z^2}\frac{1}{\left(\frac{1}{2}\right)!2^{3/2}}t^{1/2}e^{-t/2}dt\right). \qquad \text{(A-5)}$$

This result was obtained because

$$\frac{\sqrt{\pi}}{2} \equiv \left(\frac{1}{2}!\right).$$

Note that by the definition of gamma function, [Mood and Graybill, 1963, p. 128].

$$\begin{aligned}\left(\frac{1}{2}\right)! = \frac{1}{2}\left(-\frac{1}{2}\right)! &= \frac{1}{2}\int_0^\infty y^{-1/2}e^{-y}dy \\ &= \frac{1}{2}\int_0^\infty \sqrt{2}e^{-(Z^2/2)}dZ, \text{ letting } y = Z^2/2, \\ &= \sqrt{\pi}\int_0^\infty \frac{1}{\sqrt{2\pi}}e^{-Z^2/2}dZ \\ &= \frac{\sqrt{\pi}}{2},\end{aligned}$$

since the integral

$$\int_0^\infty \frac{1}{\sqrt{2\pi}}e^{-(Z^2/2)}dZ$$

is half the area under a normal density function and is therefore 1/2. The integral appeared inside the parentheses in (A-5) is an incomplete gamma function, [Mood and Graybill, 1963, p. 128], the values of which have been tabulated [Pearson, 1922].

Using the results of (A-4), and (A-5) in (A-2) yields

$$\begin{aligned}\mathrm{Var}(T) = R^2(\sigma_D^2+\mu_D^2)+R^2\Bigg[\sigma_D^2Z^2\int_Z^\infty f_N'(y)dy-\frac{1}{2}\sigma_D^2\left(1-\int_0^{Z^2}\frac{1}{\left(\frac{1}{2}!\right)2^{3/2}}t^{1/2}e^{-t/2}dt\right) \\ -2\mu_D\sigma_D L_N(Z)\Bigg]+2R(VQ+F)\sigma_D L_N(Z)+(VQ+F)^2 \\ -2\mu_D R(VQ+F)-[E(T)]^2.\end{aligned}$$

This completes the proof for the variance of profit when $f(D)$ is a normal distribution.

C. *The Derivation of the Value of Q that Maximizes the Probability $P(G \leq T < (R-V)Q-F)$.*

$$P(G \leq T < (R-V)Q-F) = \int_G^{(R-V)Q-F} g(T)dT \qquad \text{(A-7)}$$

$$= \int_{(G+VQ+F)/R}^{Q} f_N(D)dD, \quad \text{Since} \quad D = \frac{T+VQ+F}{R}.$$

$$\frac{d}{dQ}\int_{(G+VQ+F)/R}^{Q} f_N(D)dD = -\frac{V}{R}f_N\left(\frac{G+VQ+F}{R}\right)+f_N(Q) \qquad \text{(A-8)}$$

(By Leibnitz's rule [Spiegel, 1963, p. 163].) Setting to zero the first derivative given in (A-8) yields

$$\frac{f_N(Q)}{f_N\left(\dfrac{G+VQ+F}{R}\right)}=\frac{V}{R} \qquad \text{(A-9)}$$

where

$$f_N(x)=\frac{1}{\sigma_D\sqrt{2\pi}}e^{-(x-\mu_D)2/(2\sigma_D^2)},$$

a normal density function. Taking the natural logarithm on both sides of the equation (A-9) leads to

$$\frac{1}{2\sigma_D^2}[(W-\mu_D)^2-(Q-\mu_D)^2]=\ln V-\ln R \qquad \text{(A-10)}$$

where

$$W=\frac{G+VQ+F}{R}.$$

Simplifying (A-10) and collecting terms yield the following quadratic equation:

$$aQ^2+bQ+c=0 \qquad \text{(A-11)}$$

where

$$a=V^2-R^2$$
$$b=2(G+F)V-2\mu_D R(V-R)$$
$$c=(G+F)^2-2R^2\sigma_D^2(\ln V-\ln R)-2\mu_D R(G+F).$$

The solutions of (A-11) is given by the following quadratic formula:

$$Q=\frac{-b\pm\sqrt{b^2-4ac}}{2a}. \qquad \text{(A-12)}$$

To determine which Q in (A-12) maximizes the probability (A-7), one must find the second derivative of (A-7) with respect to Q and then state that this second derivative be less than zero—the sufficient condition for maximization. The result is

$$-\frac{(Q-\mu_D)}{\sigma_D^2}e^{-(Q-\mu_D)^2/2\sigma_D^2}+\frac{V^2(W-\mu_D)}{\sigma_D^2R^2}e^{-(W-\mu_D)^2/2\sigma_D^2}<0 \qquad \text{(A-13)}$$

where W was defined in (A-10). Again, rearranging terms and taking natural logarithms of (A-13) yield the inequality

$$\ln\frac{R^3(Q-\mu_D)}{V^2(G+VQ+F-R\mu_D)}+\frac{1}{2\sigma_D^2}[W-\mu_D)^2-(Q-\mu_D)^2]>0 \qquad \text{(A-14)}$$

Equation (A-10) indicates that the second term in (A-14) equals ($\ln V-\ln R$), and therefore

$$\ln \frac{R^3(Q-\mu_D)}{V^2(G+VQ+F-R\mu_D)} + \ln \frac{V}{R} > 0 \tag{A-15}$$

which means

$$\ln\left(\frac{R^3(Q-\mu_D)}{V^2(G+VQ+F-R\mu_D)}\left(\frac{V}{R}\right)\right) > 0 \tag{A-16}$$

Equation (A-16) implies that

$$\frac{R^2(Q-\mu_D)}{V(G+VQ+F-R\mu_D)} > 1 \tag{A-17}$$

and from which one obtains the following condition

$$Q > \frac{(G+F)V-\mu_D R(V-R)}{R^2-V^2}. \tag{A-18}$$

This completes the proof of equations (20) and (21) in the text.

(A-18) is the condition that a root from (A-12) must satisfy in order for the root to maximize the probability of making at least G dollars of profit. In order to guarantee that there exists a Q in (A-12) that also satisfies (A-18), it is necessary that $b^2-4ac>0$.

D. *The Total Probability of the Profit Distribution $g(T)$.*

By definition, the total probability of $g(T)$ is

$$\begin{aligned}\int_Q^\infty f(D)dD + \int_{T_{\min}}^{(R-V)Q-F} \frac{1}{R} f(D)dT &= \int_Q^\infty f(D)dD + \int_{D_{\min}}^Q \frac{1}{R} f(D)RdD \\ &= \int_{D_{\min}}^Q f(D)dD + \int_Q^\infty f(D)dD = 1. \quad \text{(A-19)}\end{aligned}$$

This proves that the total probability of $g(T)$ is equal to 1. Since $g(T)$ is a function of $f(D)$ and R, and since both $f(D)$ and R are ≥ 0, and therefore $g(T)$ is also ≥ 0. This plus the result of (A-19) clearly demonstrate that $g(T)$ is a probability distribution.

E. *A Descriptive Summary of Several Key Equations Derived in the Paper.*

For purposes of clarification, this note provides a descriptive summary of several of the key equations derived in this paper.

a. Equation (8) represents the general probability distribution of profit T, for any continuous demand distribution $f(D)$, given the values of selling price R, variable cost V, fixed cost F, the lower and upper limits of demand, $D_{\max}$ and $D_{\min}$, as well as the production quantity Q.
b. Equation (12) represents the probability distribution of profit when demand varies according to a normal distribution.
c. Equation (13) and (14) represent, respectively, the expected value (mean) and variance of profit when demand varies according to a normal distribution.
d. Equation (17) is the formula which determines the production quantity that will maximize the expected value of profit assuming that demand is normally distributed.

e. Equation (19) measures the probability that profit will be at least equal to G, but less than $(R-V)Q-F$, assuming that the demand is normally distributed, where $(R-V)Q-F$ is the upper limit of the profit.

f. Equation (24) is developed to yield the production quantity that will maximize the desired probability expressed in Equation (19).

F. *A FORTRAN Program for the Determination of the Optimal Production Quantity that Maximizes the Probability of Making A Minimum of $G Profit.*

```
    DIMENSION G(100),PGA(100),PGB(100),ZA(100),ZB(100)
  1 READ(5,15,END=999) R,V,F,AG,STD,N
 15 FORMAT(3F10.0,2F6.0,I4)
    READ(5,25) (G(I),I=1,N)
 25 FORMAT(7F10.0)
    WRITE(6,85)R,V,F,AG,STD
 85 FORMAT(‘1’,8×,‘SALE PRICE=’,F10.4,4×,‘VAR COST=’,F10.4,4×,‘FIX
   1COST=’,F10.0,4×,‘AVE DEMAND=’,F10.4,4×,‘STD DEV=’,F8.0)
    WRITE (6,45)
 45 FORMAT(‘0’,2×,‘MIN DESIRED PEOFIT’,5×,‘PROD. QUANTITY A’,5×,‘PROD.
   1QUANTITY B’.5×,‘MIN PROD. QUANTITY’,5×,‘Z SCORE A’,5×,‘Z SCORE B’,
   1/,130(1H*))
    DO 35 I=1,N
    A=V**2-R**2
    B=2.0*(G(I)+F)*V-2.0*AG*R*(V-R)
    C=(G(I)+F)**2-2.0*R**2*STD**2*(ALOG(V)-ALOG(R))
   1-2.0*AG*R*(G(I)+F)
    PGA(I)=(-B+SQRT(B**2-4.0*A*C))/(2.0*A)
    PGB(I)=(-B-SQRT(B**2-4.0*A*C))/(2.0*A)
    ZA(I)=((G(I)+V*PGA(I)+F)/R-AG)/STD
    ZB(I)=((G(I)+V*PGB(I)+F)/R-AG)/STD
    QMIN=(V*(G(I)+F-R*AG)+AG*R**2)/(R**2-V**2)
    WRITE(6,55) G(I),PGA(I),PGB(I),QMIN,ZA(I),ZB(I)
 55 FORMAT(‘0’,5×,F15.5,5×,F15.5,5×,F15.5,5×,F15.5,5×,F10.5,5×,F10.5)
 35 CONTINUE
    GO TO 1
999 STOP
    END
```

Note: 1. G(I)=The Desired Level of Profit
2. PGA(1)=The first root of Q
3. PGB(I)=The second root of Q
4. N=The number of entries
5. ZA(I)=The Z value corresponding to PGA(I)
6. ZB(I)=The Z value corresponding to PGB(I)
7. Input formats are specified in the Program
8. The optimal value of Q must be greater than “Min. Prod. Quantity.”
9. Problems may be stacked without any separation.

G. *A FORTRAN Program for Computing Mean, and Standard Deviation of Profit, and the Probability that Profit will be at least $T for various values of Q. This program must be run on the Computer with IMSL Subroutines for Incomplete Gamma (MDGAM) and Cumulative Normal (MDNOR).*

```
    REAL *4 TITLE(10)
    KOUNT=0
  1 READ(5,10,END=999) TITLE
```

```
 10 FORMAT(10A4)
    READ(5,30) R,V,F,AG,STD,T
 30 FORMAT(3F10.0,3F7.0)
    IF(KOUNT .GT.0) GO TO 25
    WRITE(6,20) TITLE
 20 FORMAT(‘1’,60×,10A4,//)
    WRITE(6,40) R,V,F,AG,STD
 40 FORMAT(‘0’,5×,‘SALE PRICE=’,F6.0,2×,‘VAR. COST=’,F5.0,
   12×.‘FIX COST=’.F10.0.2×.‘AVE DEMD=’.F9.0.2×.‘STD. DEV.=’.F8.0)
    WRITE(6.50)
 50 FORMAT(‘0’,5×,‘PRODUCTION’,11×,‘EXPECTED’,17×,‘STANDARD’,10×,
   1‘INCOMPLETE’, 8×,‘CUMULATIVE’,15×,‘UNIT NORMAL’,/,6×,‘QUANTITY’,
   113×,‘PROFIT’,19×,‘DEVIATION’,12×,‘GAMMA’,12×,‘NORMAL’,15×,
   1‘LOSS INTEGRAL’,/,130(1H*))
    P=1.5
    DO 60 K=4600,6100,10
    Q=K
    Y=(Q-AG)/STD
    X=(y**2)/2
    DSY=0.398941*EXP(-0.5*Y**2)
    CALL MDNOR(Y,ERF)
    TRF=1.0-ERF
    UNLI=DSY-Y*TRF
    CALL MDGAM(X,P,PROB,IER)
    EP=R*AG-(R*STD*UNLI+V*Q)-F
     VAR=(STD**2+AG**2)*R**2+R**2*((STD**2)*(Y**2)*TRF-2.0*AG*STD*UNLI-
   10.5*STD**2*(1.0-PROB))+2.0*R*(V*Q+F)*STD*UNLI+(V*Q+F)**2
   1-2.0*AG*R*(V*Q+F)-EP**2
    SDV=VAR**0.5
    WRITE(6,70) Q,EP,SDV,PROB,TRF,UNLI
 70 FORMAT(‘0’,4×,F15.5,6×,F15.5,6×,F15.5,9×,F7.5,10×,F7.5,10×,F15.5)
 60 CONTINUE
    KOUNT=KOUNT+1
 25 WRITE(6,95)
 95 FORMAT(‘1’,5×,‘PRODUCTION QUANTITY’,10×‘DESIRED PROFIT’,12×,
   1‘WRF’,16×,‘SRF’,14×,‘PROB. P IS AT LEAST T’,/,130(1H*))
    DO 100 K=4600,6100,10
    S=K
    Y=(S-AG)/STD
    CALL MDNOR(Y,ERF)
    SRF=1.0-ERF
    W=(T+V*S+F)/R
    Y=(W-AG)/STD
    CALL MDNOR(Y,ERF)
    WRF=1.0-ERF
    PPGT=WRF-SRF
    WRITE(6,90)S,T,WRF.SRF,PPGT
 90 FORMAT(‘0’,5×,F15.5,10×,F15.5,10×,F9.5,10×,F9.5,22×,F9.5)
100 CONTINUE
    GO TO 1
999 STOP
    END
```

Note: 1. A Title card is required.

2. AG=Average Demand; STD=Standard Deviation of Demand.
3. EP=Expected Profit; SDV=Standard Deviation of Profit.
4. K=The range of Q values which may vary from one problem to another.
5. PPGT=Probability that Profit will be at least T.
6. R,V,F,T are defined in the paper.
7. Input Formats are specified in the Program.
8. Problems may be stacked without any separation.

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Effects of Budgetary Goal Characteristics on Managerial Attitudes and Performance

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ABSTRACT: This study examines some effects of budgetary goal characteristics of participation, clarity, feedback, evaluation, and difficulty on job-related attitudes (job satisfaction, job involvement, job tension), budget-related attitudes (attitude towards budgets, budgetary motivation), and self-rated performance (budgetary performance, cost efficiency, job performance) for 169 department managers at the plant level who have budget responsibility. The results show that budgetary participation and budget goal clarity tend to have positive and significant effects on job-related and budget-related attitudes of managers. Participation and goal clarity, furthermore, were found to have significant influence on budgetary performance of managers. High level of budget goal difficulty was found to have an adverse effect on attitudes and performance of managers. Effects of budgetary evaluation and feedback on attitudes and performance of managers, on the other hand, were found to be weak or insignificant.

A BUDGET is not only a financial plan that sets forth cost and revenue goals for responsibility centers within a business firm, but also a device for control, coordination, communication, performance evaluation, and motivation. Knowledge of the budgeted goals (feedforward) and information about the extent to which those goals have been achieved (feedback) provides managers a basis for measuring efficiency, indentifying problems, and controlling costs. In terms of timing and magnitude, coordination of various functional activities in the firm (sales, production, purchasing, cash flows, *etc.*) is also accomplished through the process of budget preparation and application.

Communication of budgeted goals downward in an organization informs members of lower management about what upper management expects of them; conversely, upper management learns about the accomplishments and problems of lower management through upward-flowing reports comparing budgeted goals with actual performance. Furthermore, budget information helps upper management to evaluate the performance of lower managers and distribute rewards and punishments. In this context, budgets represent an important part of the organization's motivational system designed to improve managerial attitudes and performance.

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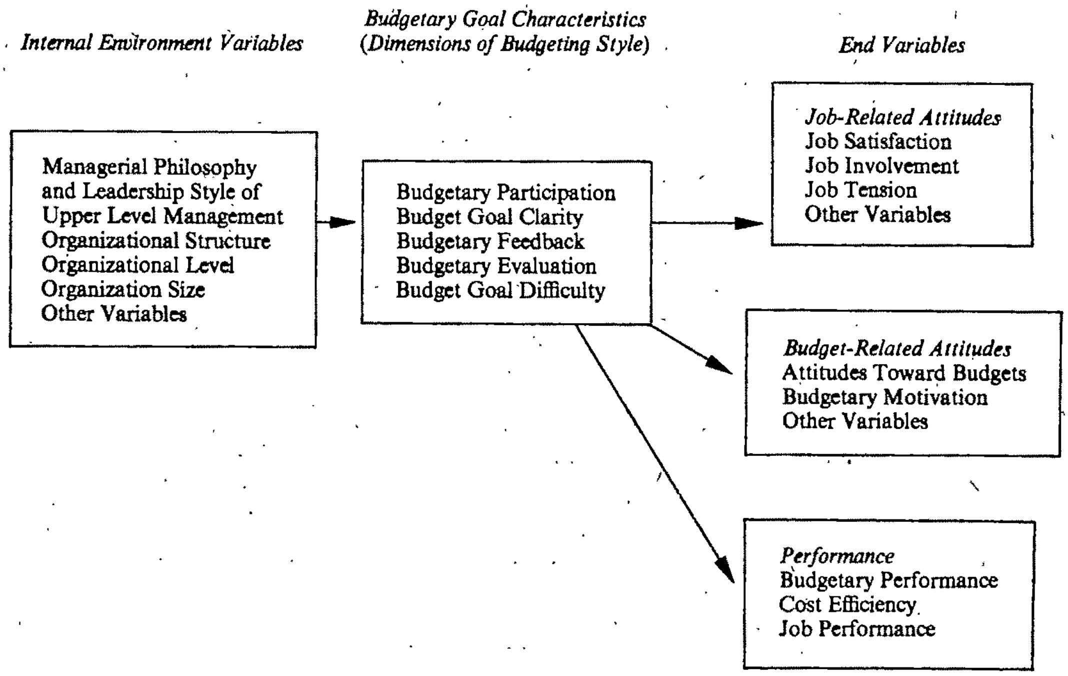
FIGURE 1
A FRAMEWORK OF BUDGETARY RELATIONSHIPS



All of these aspects suggest that budgets potentially may be a useful managerial tool. However, improperly applied budgets can lead to dysfunctional behavior and negative attitudes among organizational members [Argyris, 1952; Wallace, 1966; Schiff and Lewin, 1970].

Most of the positive and negative effects of budgets on the attitudes, behavior, and performance of lower managers can be traced to the budgeting style of upper management. The concept of budgeting style includes such budgetary goal characteristics as participation, goal clarity, feedback, bugetary evaluation, and goal difficulty. Indeed, upper management, with the help of the controller and the accounting department, can influence the amount and form of participation of lower managers in budget goal setting, the extent of clarity of budget goals, the frequency and amount of feedback, the fashion in which budgets are used in performance evaluation, and the degree of budget goal difficulty. Budgeting style in an organization often reflects the leadership style and managerial philosophy of upper management [Argyris, 1952; DeCoster and Fertakis, 1968; Hopwood, 1972]. In addition, such organizational variables as structure (centralized versus decentralized), size, and level may influence the budgeting style of upper management [Searfoss and Monczka, 1973; Bruns and Waterhouse, 1975; Swieringa and Moncur, 1975]. These relationships can be illustrated in a framework as presented in Figure 1.

This study presents an empirical examination of some effects of budgetary goal characteristics (dimensions of budgeting style) on job-related attitudes (job satisfaction, job involvement, job tension), budget-related attitudes (attitude toward budgets, budgetary motivation), and performance (budgetary performance, cost efficiency, job performance) of lower level managers in industry. The following is a brief review of literature related to the goal characteristics included in the study.

BUDGETARY GOAL CHARACTERISTICS

Budgetary Participation

Budgetary participation refers to the extent to which managers participate in preparing the budget and influence the budget goals of their responsibility centers. Many authors have suggested that participation in setting budgetary goals encourages managers to identify with the goals, accept them more fully, and work toward their achievement [Argyris, 1952; Becker and Green, 1962; Wallace, 1966; Hanson, 1966; Dunbar, 1971]. Participation in task-goal setting and decision making has also been encouraged and promoted by such behavioral scientists as McGregor, Likert, Argyris, and Locke. The results of many empirical studies have supported the positive effects of such participation on subordinates' attitudes; with respect to performance, however, the findings generally have been inconclusive [Vroom, 1964; Lowin, 1968; Yukl, 1971].

Steers [1976] found positive and significant relationships between participation in task-goal setting and job satisfaction and job involvement, but no relationship between participation and employee performance. Many other studies reported little or no relationship between subordinates' participation in goal setting and their performance, goal acceptance, or goal attainment [French et al., 1966; Carroll and Tosi, 1970– Latham and Yukl, 1976; Ivancevich, 1976].

The few budgetary studies in this area have reported similar results. Milani [1975], for example, found positive and significant correlations between participation in budget setting and attitudes toward the job and company; but the relationship between participation and job performance was very weak. Swieringa and Moncur [1975] found higher need satisfaction among managers who were consulted on their budgets than those who were not consulted. Similarly, Hofstede [1967] reported positive attitudes among subordinates who participated in budgeting.

Budget Goal Clarity

Budget goal clarity refers to the extent to which budget goals are stated specifically and clearly, and are understood by those who are responsible for meeting them. Locke [1968] suggested that setting specific goals is more productive than not setting goals and urging employees to do the best they can. He claimed that conscious goals regulate behavior. Ambiguously stated goals can lead to the confusion, tension, and dissatisfaction of employees. Several research studies support the positive effects of task-goal clarity and specificity on the goal commitment, goal achievement, and satisfaction of employees [Latham and Yukl, 1975; Steers, 1976; Ivancevich, 1976]. Studies dealing with goal clarity in budgeting, however, have been lacking.

Budgetary Feedback

Feedback about the degree to which budget goals have been achieved is an important motivational variable. If members of an organization do not know the results of their efforts, they have no basis for feelings of success or failure and no incentive for higher performance; furthermore, they might become dissatisfied [Becker and Green, 1962]. The few empirical studies on the effects of feedback on performance, however, give inconclusive results. Carroll and Tosi [1970], for example, found feedback to be positively correlated with self-rated goal attainment, but not with self-rated effort level. Steers [1975] and Kim and Hamner [1976] also reported positive and significant correlations between feedback and performance. Studies by Chapanis [1964] and by Hackman and Lawler [1971], on the other hand, failed to support these findings.

Budgetary Evaluation

Budgetary evaluation refers to the extent to which budget variances are traced back to individual department heads and used in evaluating their performance. The fashion in which budgets are used in performance evaluation tend to influence the behavior, attitudes, and performance of the participants. A punitive approach, for example, can lead to lower motivation and negative attitudes; a supportive approach, on the other hand, may result in positive attitudes and behavior [Welsch, 1976].

Budget Goal Difficulty

Budget goals may range from very loose and easily attainable to very tight and unattainable. Easily attainable goals fail to present a challenge to participants and, therefore, have little motivational effect. Very tight and unattainable goals, on the other hand, lead to feelings of failure, frustration, lower aspiration levels, and rejection of the goals by the participants [Becker and Green, 1962; Dunbar, 1971]. Most budgeting textbooks suggest that for motivational purposes budgetary goals should be tight but attainable. Hofstede [1967] stated that tighter budget goals lead to higher motivation; beyond a certain limit, however, tightening budget goals reduces motivation. Locke [1968] also claimed that difficult task goals lead to better performance than easy goals.

Findings of several studies failed to provide such clear evidence. Carroll and Tosi [1970], for example, found a positive and significant correlation between perceived task-goal difficulty of managers and their self-rated performance. Blumenfeld and Leidy [1969] also reported that the performance of salesmen and servicemen who were assigned more difficult goals was higher than the performance of those who were assigned easy goals. But results of studies by Stedry and Kay [1966] and Steers [1975] failed to support the positive effects of goal difficulty on motivation and performance.

HYPOTHESES

This study will examine the following hypotheses:

1. Budgetary participation, budget goal clarity, and budgetary feedback will have a positive effect on job satisfaction and job involvement, and will decrease job tension; budgetary evaluation and budget goal difficulty, on the other hand, will have a negative effect on job satisfaction and job involvement, and will increase job tension.
2. Budgetary participation, budget goal clarity, and budgetary feedback will lead to better attitude toward budgets and higher budgetary motivation, whereas budgetary evaluation and budget goal difficulty will lead to negative attitude toward budgets and lower budgetary motivation.
3. Budgetary participation, budget goal clarity, and budgetary feedback will have a positive effect on budgetary performance, cost efficiency, and job performance; budgetary evaluation and budget goal difficulty, however, will have a negative effect on budgetary performance, cost efficiency, and job performance.

METHOD

The Sample

The sample of the study consisted of department managers and supervisors of plants located in the New Jersey-Philadelphia area. Twenty-eight plants employing over 500 persons were asked to participate in this study, and 19 plants belonging to 16 manufacturing companies agreed. Two hundred and ninety-eight questionnaires were distributed to department heads in these plants who were identified by the plant managers and controllers as having budget responsibility. The main criteria used for inclusion in the sample were whether the manager had a clearly defined responsibility for meeting his budget and whether variances were computed and reported to plant management for performance evaluation. Top plant managers and assistant managers were excluded from the sample. Because complete lists of managers who met these criteria were not made available, a random selection of the subjects was not possible. Plant managements determined the participants.

In order to minimize response bias, the participants were provided with return envelopes to send the completed questionnaires directly to the researcher. A cover letter explaining the purpose of the study assured the subjects of the confidentiality of their responses.

Of the 298 questionnaires distributed, 178 were returned, and these yielded 169 usable questionnaires for this analysis (a 56 percent response rate). Sixty-three percent of the respondents reported holding college degrees; the remaining 37 percent held high school degrees, and usually reported some college education. Sixty-nine percent of the respondents reported being in their forties or fifties and 31 percent in their thirties. The respondents reported that they had been working an average of 16.8 years for their present employer and 5.5 years in their present position. The companies represented in the sample were in the food, electronics, fiberglass, kitchen appliances, and various metal products industries.

The Measurements

Measurements of Budgetary Goal Characteristics. Twenty-six Likert-type questionnaire items, scored from one to five, were used to measure the budgetary goal characteristics. These included 10 items from the budget-induced pressure questionnaire [Fertakis, 1967] derived by Searfoss and Monczka [1973]; 14 items from the task-goal attributes (participation, goal clarity, feedback, goal difficulty) questionnaires developed by Steers [1976], which were reworded to fit the budgetary goal setting environment; and two items which appeared to have face validity.

Factor analysis, using the Statistical Package for Social Sciences [Nie et al., 1975], was employed to identify the patterns of relations among the 26 questionnaire items. Six factors with eigenvalues greater than one were extracted. These six factors accounted for 65 percent of the common variance of the 26 items. The initial principal factor matrix was rotated orthogonally (Varimax) to reach a final solution. The Varimax-rotated factor matrix is presented in Appendix A; the descriptions of the questionnaire items are presented in Appendix B.

The names assigned to the factors and the meaning of higher scores on each factor are: (1) budgetary participation—greater participation and influence by managers in setting their budgetary goals; (2) budget goal difficulty—higher budget goal difficulty as perceived by the managers; (3) budgetary evaluation, general—use of budgets in performance

TABLE 1

CORRELATIONS BETWEEN BUDGETARY GOAL CHARACTERISTICS VARIABLES (INDEPENDENT VARIABLES)

	1	*2*	*3*	*4*	*5*	*6*
1. Budgetary Participation	1.00	−.008	−.023	−.01	.019	.068
2. Budget Goal Difficulty		1.00	−.002	.04	.05	−.009
3. Budgetary Evaluation—General			1.00	.11	.05	.03
4. Budgetary Evaluation—Punitive				1.00	.06	−.03
5. Budgetary Feedback					1.00	.05
6. Budgetary Goal Clarity						1.00

All correlations not significant at .05 level.

evaluation in general to a higher degree; (4) budgetary evaluation, punitive—greater use of budgets in performance evaluation in a punitive fashion; (5) budgetary feedback—greater amount of feedback about budgetary performance received by the managers; (6) budget goal clarity—greater clarity of budget goals and better understanding of the goals by the managers.

In order to study the effects of these six budgetary goal characteristics on the job-related and budget-related attitudes and performance of managers, standard factor scores were computed for each manager on each of the six factors [Nie et al., 1975]. As the interscale correlations on Table 1 show, the resulting measurements appear to be relatively independent; none of the correlations reached the .05 significance level.

Measurements of Job-Related Attitudes. Job satisfaction was measured by the Job Descriptive Index (JDI) which is a combination of five subscales measuring satisfaction with work, supervision, pay, promotion, and co-workers [Smith et al., 1969]. Each subscale consists of positive and negative statements about an aspect of the job. The respondents answer either "yes," "undecided," or "no." A "yes" answer to a positive item receives a score of 3, "undecided" a score of 1, and a "no" answer is scored zero. The negative items are scored in the opposite fashion. The overall job satisfaction score for a respondent, which can range from zero to 216, is obtained by adding all the scores for the five dimensions. This scale is one of the most widely used and carefully constructed measures of job satisfaction in existence today; it consistently has demonstrated high reliability and validity.

Job involvement is measured by a six-item scale developed by Lodahl and Kejner [1965]. This scale measures the degree to which individuals identify psychologically with their jobs and the importance of the job to their self-image. The internal reliability [Cronbach, 1951] of the scale was computed as .93. Job tension, which represents tension arising from psychologically stressful circumstances in the job environment, was measured by nine items chosen from the job-related tension index developed by Kahn et al. [1964]. This scale demonstrated .85 internal reliability. Even though these three variables correlated significantly with each other, as many other studies have demonstrated, they are considered by behavioral scientists as independent dimensions of job-related attitudes.

Measurements of Budget-Related Attitudes. Attitude toward budgets was measured by a four-item scale from Swieringa and Moncur [1975]. The scale, which demonstrated .77 internal reliability,

TABLE 2

MEANS, STANDARD DEVIATIONS AND INTERCORRELATIONS OF THE ATTITUDE AND PERFORMANCE (DEPENDENT) VARIABLES

			Intercorrelations							
n=169	*Mean*	*S.D.*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1—Job Satisfaction (0–216)	158.7	29.4	1:00	.21*	−.33*	.23*	.20*	.18**	.18**	.11
2—Job Involvement (1–5)	2.91	.57		1:00	−.04	.18**	.17**	.12	.07	.14
3—Job Tension (1–5)	2.51	.66			1:00	−.19*	−.09	−.28*	−.28*	−.13
4—Attitude Toward Budgets (1–5)	3.13	.76				1:00	.41*	.25*	.11	.15
5—Budgetary Motivation (1–5)	3.65	.72					1:00	.16	.04	.14
6—Budgetary Performance (1–7)	5.19	1.11						1:00	.37*	.05
7—Cost Efficiency (1–5)	4.07	.67							1:00	.17**
8—Job Performance (1–5)	4.44	.52								1:00

* Significant at .01 level.
** Significant at .05 level.

measures the feelings of the participants about the usefulness of budgeting to themselves as managers. The three-item scale used by Hackman and Lawler [1971] to measure intrinsic motivation was reworded to fit the budgetary situation and used here to measure budgetary motivation. This scale, which demonstrated an internal reliability of .79, measures the extent that the participants feel personal satisfaction and self-esteem when they achieve their budget goals. Even though these two variables correlated significantly with each other, factor analysis of the inter-item correlations demonstrated that they can be used as separate dimensions of budget-related attitudes.

All of the above-mentioned attitude scales, with the exception of the job satisfaction scale, were five-point Likert-type scales scored from one to five. Scores on all items of each scale were averaged to arrive at a set of summary scores from each respondent.

Measurements of Performance Variables. The self-rated budgetary performance was measured by asking the respondents to indicate on a seven-point scale how often they have met their budget goals (have favorable variances). The responses ranged from never to always. The respondents were also asked to rate the cost efficiency of their departments and their overall job performance; both used a five-point scale ranging from very poor to very good. The means, standard deviations, and intercorrelations of the dependent attitude and performance variables discussed above are presented in Table 2.

The hypotheses of the study were tested by using regression analysis (stepwise). t-statistics were used to test the significance level of the regression coefficients and F-values were used to test significance level of the overall regressions. R^2, which represents the percentage of variation of the dependent variables (attitude and performance) explained by the six independent variables (budget goal characteristics), and R^2-Change which shows the contribution of the individual independent variables, were computed for each of the eight regressions (Table 3). t-statistics were also used to test the significance level of differences between mean attitude and performance scores computed for different levels of goal difficulty (Table 4), and F-values were used to test the significance level of the differences between subsample atti-

TABLE 3

RELATIONSHIPS BETWEEN BUDGETARY GOAL CHARACTERISTICS (INDEPENDENT VARIABLES) AND ATTITUDES AND PERFORMANCE OF MANAGERS (DEPENDENT VARIABLES)

		Independent Variables					
Dependent Variables		*Participation*	*Goal Difficulty*	*Budgetary Evaluation —General*	*Budgetary Evaluation —Punitive*	*Feedback*	*Goal Clarity*
Job Satisfaction	*Constant*						
Regression Coefficients	158.78	7.810	−4.602	−2.426	−2.323	7.701	10.579
t value		3.76*	2.11**	1.14	1.02	3.53*	4.97*
R^2 change ($R^2=.28$)		.07	.02	.007	.005	.05	.13
Adjusted $R^2=.25$							
F value = 10.47*							
Job Involvement							
Regression Coefficients	2.92	.093	.068	.070	.075	.076	.074
t value		2.05**	1.43	1.46	1.51	1.59	1.60
R^2 change ($R^2=.09$)		.026	.010	.012	.010	.015	.017
Adjusted $R^2=.06$							
F value = 2.73**							
Job Tension							
Regression Coefficients	2.51	−.121	.135	.018	.174	−.073	−.318
t value		2.69*	2.83*	.39	3.52*	1.54	6.86*
R^2 change ($R^2=.34$)		.03	.03	.00	.054	.01	.215
Adjusted $R^2=.32$							
F value = 13.97*							
Attitude Toward Budgets							
Regression Coefficients	3.13	.275	.105	.142	.078	.090	.238
t value		5.16*	1.87	2.54**	1.34	1.61	4.36*
R^2 change ($R^2=.29$)		.13	.02	.03	.008	.01	.09
Adjusted $R^2=.26$							
F value = 10.97*							
Budgetary Motivation							
Regression Coefficients	3.65	.149	.128	.127	.158	.153	.195
t value		2.87*	2.35**	2.33**	2.78*	2.83*	3.67*
R^2 change ($R^2=.25$)		.04	.025	.025	.05	.04	.07
Adjusted $R^2=.22$							
F value = 9.21*							
Budgetary Performance							
Regression Coefficients	5.20	.374	−.167	.249	−.276	.060	2.70
t value		4.75*	2.02**	3.03*	3.21*	.73	3.35*
R^2 change ($R^2=.27$)		.11	.02	.04	.04	.002	.06
Adjusted $R^2=.24$							
F value = 10.07*							
Cost Efficiency							
Regression Coefficients	4.07	.095	−.063	−.050	−.141	.084	.170
t value		1.83	1.15	.92	2.50**	1.54	3.19*
R^2 change ($R^2=.14$)		.018	.007	.004	.03	.013	.066
Adjusted $R^2=.11$							
F value = 4.34*							
Job Performance							
Regression Coefficients	4.44	.052	.031	.011	−.106	.000	.078
t value		1.25	.70	.24	2.31**	—	1.81
R^2 change ($R^2=.06$)		.008	.003	.000	.03	.000	.02
Adjusted $R^2=.04$							
F value = 2.24**							

* Significant at .01 level.
** Significant at .05 level.

tude and performance score variances [Snedecor and Cochran, 1968].

RESULTS

Budgetary Goal Characteristics and Job-Related Attitudes

The regression coefficients testing the significance of the hypothesized relationships are presented in Table 3. The results support Hypothesis 1 for the effects of budgetary participation, feedback, and goal clarity on job satisfaction; however, the results fail to support the hypothesized negative effects of budgetary evaluation (general and punitive) and goal difficulty on job satisfaction of managers. Participation, goal clarity, and feedback were positively and significantly related to job satisfaction ($R^2 > .05$, $p < .01$, *d.f.* = 162).[1] The relationships of budgetary evaluation and goal difficulty to job satisfaction were in the expected direction but were not statistically significant. The combined influence of the budgetary goal characteristics on job satisfaction of managers, on the other hand, appeared to be relatively strong ($R^2 = .28$, $p < .01$, *d.f.* = 6, 162).

The results generally fail to support Hypothesis 1 on job involvement. The relationships between the individual budgetary goal characteristics and job involvement were either weak or insignificant. Overall, the goal characteristics explain only a small percentage of the variation in job involvement ($R^2 = .09$, $p < .01$, d.f. = 6, 162).

On the other hand, a relatively strong association appeared to exist between the budgetary goal characteristics as a whole and job tension ($R^2 = .34$, $p < .01$, d.f. = 6, 162). Hypothesis 1 on the effects of the goal characteristics on job tension is supported in all cases, except for budgetary evaluation—general and feedback. Of the six variables, however, budget goal clarity emerged as the strongest predictor of job tension; in fact, goal clarity alone accounted for 22 percent of the variation in job tension. The contributions of participation, goal difficulty, and budgetary evaluation-punitive in explaining the variance of job tension, on the other hand, ranged between three and five percent ($p < .01$).

Budgetary Goal Characteristics and Budget-Related Attitudes

The results suggest that budgetary goal characteristics, taken as a whole, may play an important role in improving the attitudes of managers toward budgets ($R^2 = .29, p < .01$, d.f. = 6, 162). Of the six goal characteristics, only budgetary participation and goal clarity were positively and significantly related to the managers' attitudes toward budgets ($R^2 > .09$, $p < .01$, d.f. = 162). Hypothesis 2, therefore, is supported only for the positive effects of participation and goal clarity on the attitude toward budgets.

The results also reveal that the goal characteristics tend to improve the budgetary motivation of managers ($R^2 = .25$, $p < .01$, d.f. = 6, 162). The relationships between budgetary motivation and all of the individual goal characteristics variables were positive and, except for budgetary evaluation-general and goal difficulty, significant ($R^2 > .04$, $p < .01$, d.f. = 162). The results, therefore, support Hypothesis 2 for the positive effects of budgetary participation, feedback, and goal clarity on budgetary motivation. Contrary to Hypothesis 2, however, a positive relationship appeared to exist between budgetary evaluation-punitive and budgetary motivation ($R^2 = .05$, $p < .01$, d.f. = 162).

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[1] In other words, the regression coefficients related to participation, goal clarity, and feedback were all positive and significant at .01 level (162 degrees of freedom) and each of these variables explain at least five percent of the variation in job satisfaction of managers.

Budgetary Goal Characteristics and Performance

As predicted in Hypothesis 3, budgetary participation and goal clarity were related positively ($R^2 > .06$, $p < .01$, d.f. $= 162$), and budgetary evaluation-punitive was related negatively ($R^2 = .04$, $p < .01$, d.f. $= 162$) to budgetary performance; contrary to the hypothesis, however, the relationship between budgetary evaluation-general and budgetary performance appeared to be positive rather than negative ($R^2 = .04$, $p < .01$, d.f. $= 162$). Neither feedback nor goal difficulty, on the other hand, were significant in predicting budgetary performance scores. The results suggest that the budgetary goal characteristics, as a whole, tend to have a relatively strong influence on budgetary performance of managers ($R^2 = .27$, $p < .01$, d.f. $= 6, 162$).

The overall influence of the budgetary goal characteristics on the self-rated cost efficiency of managers appears relatively weak ($R^2 = .14$, $p < .01$, d.f. $= 6, 162$). Only one goal characteristic, goal clarity, was found to have a positive and significant relationship with cost efficiency ($R^2 = .066$, $p < .01$, d.f. $= 162$). Hypothesis 3 is supported by the results only for the positive effect of goal clarity on cost efficiency.

The association between the budgetary goal characteristics and job performance appears even weaker ($R^2 = .06$, $p < .05$, d.f. $= 6, 162$). In fact, none of the regression coefficients reached the .01 significance level. Therefore, the results fail to support Hypothesis 3 for the effects of the goal characteristics on job performance of managers.

Budget Goal Difficulty: A Closer Look

Overall, the relationships between budget goal difficulty, as a continuum, and the attitude and performance variables discussed above were found to be very weak. However, when the trends of mean scores of the attitude and performance variables are examined at different levels of goal difficulty (about right, tight but attainable, too tight), non-linear relationships seem to exist between budget goal difficulty and job satisfaction, job tension, attitude toward budgets, budgetary motivation, budgetary performance, and cost efficiency.

The data presented on Table 4 reveal that while managers who felt their budget goals were "about right" or "tight but attainable" reported similar levels of job satisfaction and job tension, managers who felt their budget goals were "too tight" reported significantly lower job satisfaction ($t = 3.19$, $p < .01$, d.f. $= 128$) and higher job tension ($t = 3.35$, $p < .01$, d.f. $= 128$). Similarly, managers who felt they had "too tight" budget goals reported lower frequency of meeting their budgets ($t = 2.52$, $p < .01$, d.f. $= 22$) and lower self-rated cost efficiency in their departments ($t = 2.75$, $p < .01$, d.f. $= 22$) than those who felt their budget goals were "tight but attainable" or "about right." The mean scores of budgetary motivation and attitude toward budgets variables, however, increase significantly ($p < .01$) and then decline slightly as the range of goal difficulty increases from "about right" to "tight but attainable" to "too tight" levels.

In conclusion, this analysis suggests that the "too tight" level of budget goal difficulty has adverse effects on the attitude and budgetary performance of managers. The "tight but attainable" range appears to be the optimum level of budget goal difficulty.

SUMMARY AND DISCUSSION

The results presented above suggest that variations in the budgeting style of upper management as reflected in the budgetary goal characteristics can have a

TABLE 4

MEAN SCORES OF ATTITUDE AND PERFORMANCE VARIABLES AT DIFFERENT LEVELS OF BUDGET GOAL DIFFICULTY

	About Right	*Tight But Attainable*	*Too Tight*	*Overall*
Difficulty Mean Score Range (5-Points)	2–3	3–4	4–5	
	n=39	*n*=109	*n*=21	*n*=169
Job Satisfaction (0–216)	160.33	161.58^{a1}	138.90^{a2}	158.68
Job Involvement (1–5)	2.80	2.99	2.86	2.91
Job Tension (1–5)	2.34	2.48^{b1}	2.99^{b2}	2.51
Attitude Toward Budgets (1–5)	2.93^{c1}	3.26^{c2}	2.90^{c3}	3.13
Budgetary Motivation (1–5)	3.41^{d1}	3.76^{d2}	3.62	3.65
Budgetary Performance (1–7)	5.46	5.27^{e1}	4.35^{e2}	5.19
Cost Efficiency (1–5)	4.08	4.18^{f1}	3.55^{f2}	4.07
Job Performance (1–5)	4.36	4.48	4.30	4.44

Note: Significant differences between means (results are the same whether *t* tests based on pooled variance or separate variances are applied):

$p<.01$ a1 vs. a2; b1 vs. b2; c1 vs. c2;
d1 vs. d2; e1 vs. e2; f1 vs. f2.
$p<.05$ c2 vs. c3.

significant impact on the attitudes and performance of lower level managers. The budgetary goal characteristics as a whole appeared to have relatively strong influence on such managerial attitude and performance variables as job satisfaction, job tension, budgetary motivation, attitude toward budgets, and self-rated budgetary performance. The effects of the goal characteristics on job involvement, cost efficiency, and job performance, on the other hand, were found to be relatively weak.

In particular, the findings suggest that managers react positively and relatively strongly to increased clarity of budget goals. Upper level management, with the help of the accounting department, can increase job satisfaction, decrease job tension, and improve budget-related attitudes, budgetary performance, and cost efficiency of lower level managers significantly by increasing the clarity and specificity of their budget goals. These results confirm the findings of various task-goal setting studies with respect to the positive effects of goal clarity on attitudes and performance [Locke, 1968; Latham and Yukl, 1975; Steers, 1976; Ivancevich, 1976].

The results of the study also support the findings of many studies conducted in budget-goal setting environments [Hofstede, 1967; Milani, 1975; Swieringa and Moncur, 1975] as well as task-goal setting environments [Locke, 1968; Steers, 1976] as to the positive effects of participation in goal setting on the attitudes of participants. Significant relationships were found between budgetary participation and both job-related attitudes (job satisfaction, job tension) and budget-related attitudes (budgetary motivation, attitude toward budgets). Furthermore, the results reveal that budgetary participation tends to improve budgetary performance of budgeted managers. However, consistent with Milani's [1975] results, participation was unrelated to job performance.

Only job satisfaction and budgetary motivation were found to have significant though somewhat weak relationships to budgetary feedback. The results imply that feedback about the degree of budget goal achievement is ineffective in improving performance and only marginally effective in improving the attitudes of managers. These findings fail to clarify the mixed results of various studies which dealt with feedback-attitude-performance relationships in task-goal setting [Chapanis, 1964; Carroll and Tosi, 1970; Hackman and Lawler, 1971; Steers, 1975; Kim and Hamner, 1976]. Various mediating variables, such as timeliness and content of feedback and other environmental factors might be the cause of these conflicting findings.

The results related to the effects of budget goal difficulty, as a continuum, on the attitudes and performance of managers were also inconclusive; all the relationships were either weak or insignificant. The positive effects of goal difficulty reported by Locke [1968], Blumenfeld and Leidy [1969], and Carroll and Tosi [1970] are not supported. However, further analysis of the data seems to confirm the contention that "too tight" budget goals have negative effects [Hofstede, 1967; Becker and Green, 1962; Dunbar, 1971]. Managers who reported having "too tight" budget goals also reported significantly higher job tension and lower job satisfaction, budgetary performance, and cost efficiency as compared to those who reported having "about right" or "tight but attainable" budget goals. The results also indicate that "tight but attainable" is the optimum level for budget goal difficulty.

Finally, the budgeted managers appeared to react unfavorably to using budgets in performance evaluation in a punitive fashion (increasing job tension, decreasing budgetary performance). However, this tendency can be discounted because of the apparently weak relationships between the variables. Budgetary evaluation-general also appeared ineffective.

Taken together, the findings suggest that upper level management may be able to improve the attitudes and budgetary performance of lower level budgeted managers by emphasizing clarity of budget goals, by soliciting participation of the managers in the determination of goals, and by stating the goals at a "tight but attainable" level. Providing feedback about budget goal achievement and using budgets in performance evaluation seem to have limited consequences.

The findings of this study, however, should be considered in the light of its limitations. The scope of the study is limited by its sample size, organizational level, and industrial coverage; only middle management at the plant level in manufacturing companies was covered. The results might have been different if managers from other manufacturing and service industries and other levels of management had been included in the sample. Also, response bias might have arisen from the self-selection of the respondents. The responses of the nonrespondents might have been different. Another bias might come from the fact that performance was self-rated; measurements based on formal performance reports or evaluations by superiors might have given different results. The Likert-type attitude measurements used might also have produced some response bias. Finally, no mediating situational variables were included; personality and needs of the managers, goal acceptance, reward expectancy, and some organizational and environmental variables are capable of influencing the relationships studied here.

Therefore, future research in this area might be directed to studying the relationships presented in this study in other industries. The influence of managerial, organizational, and other environmental variables on budgeting style of management should also be investigated, as well as the influence of mediating variables on goal characteristics-attitude-performance relationships.

APPENDIX A

VARIMAX ROTATED FACTOR MATRIX OF BUDGETARY GOAL CHARACTERISTICS ITEMS

		Factor Loadings (Rounded)						
Factors		*I*	*II*	*III*	*IV*	*V*	*VI*	*Communality*
I. Participation	1	.88	−.06	−.01	−.11	.06	.14	.82
	2	.80	−.07	−.14	−.03	.07	.18	.71
	3	.83	−.02	−.10	−.02	.00	.17	.74
	4	.53	−.03	.08	.05	.16	.20	.36
	5	.65	.04	−.02	−.07	.08	.10	.45
II. Budget Goal Difficulty	1	−.06	.68	−.06	.08	.12	.02	.49
	2	.09	.76	−.02	.08	.09	−.01	.60
	3	.12	.70	.15	−.04	.05	−.03	.53
	4	.21	.60	−.18	.13	.06	.04	.45
	5	−.18	.59	.03	−.12	.14	−.12	.43
III. Budgetary Evaluation—General	1	−.15	.04	.75	.30	.14	.04	.71
	2	−.12	.08	.82	.17	.20	.01	.77
	3	−.18	.13	.67	.19	.19	.05	.58
	4	.19	.17	.27	.18	.20	.02	.21
IV. Budgetary Evaluation—Punitive	1	.02	−.11	.20	.62	−.15	−.09	.47
	2	−.05	.20	.07	.60	.14	.08	.43
	3	−.09	.12	.15	.68	−.17	.02	.51
	4	−.07	.09	.26	.63	.10	−.06	.49
	5	−.06	.08	.17	.67	−.04	−.11	.50
	6	.18	.22	.17	.31	.08	.01	.23
V. Budgetary Feedback	1	.10	.09	.16	.17	.74	.15	.64
	2	.09	.13	.16	.12	.84	−.09	.78
	3	.06	.17	.13	.16	.58	.19	.44
VI. Budget Goal Clarity	1	.37	−.03	.08	−.06	.14	.81	.83
	2	.28	−.07	.13	−.05	.17	.79	.76
	3	.25	.07	.15	.08	.05	.69	.57
Eigenvalue		5.31	4.62	1.94	1.15	.84	.76	
Percent of variance		36.36	31.6	13.3	7.9	5.7	5.2	

APPENDIX B

QUESTIONNAIRE ITEMS OF THE BUDGETARY GOAL CHARACTERISTICS

I. *Budgetary Participation*
  1. I am allowed a high degree of influence in the determination of my budget goals.
  2. I really have little voice in the formulation of my budget goals (reverse item).
  3. The setting of my budget goals is pretty much under my control.
  4. My superior usually asks for my opinions and thoughts when determining my budget goals.
  5. My budget is not finalized until I am satisfied with it.

II. *Budget Goal Difficulty*
  1. I should not have too much difficulty in reaching my budget goals. They appear to be fairly easy (reverse item).
  2. My budget goals are quite difficult to attain.

3. My budget goals require a great deal of effort from me to achieve them.
4. It takes a high degree of skill and know-how on my part to attain fully my budget goals.
5. In general, how would you characterize the budgetary goals of your unit? ____ too loose; ____ fairly loose; ____ just right; ____ tight but attainable; ____ to tight.

III. *Budgetary Evaluation—General*

1. My superior has mentioned budgets while talking to me about my efficiency as a supervisor.
2. Budget variances in my unit have been mentioned during performance evaluation interviews by my superior.
3. Budget variances in my unit have been mentioned by my superiors as factors in considering me for pay raises.
4. My superior has held me personally accountable for budget variances in my department (unit).

IV. *Budgetary Evaluation—Punitive*

1. My superior has been dissatisfied with my explanation of budget variances in my unit.
2. My superior has spoken to me about increasing production to meet budget goals.
3. My superior has expressed dissatisfaction to me about results in my unit (dept.) when the budget has not been met.
4. Large budget variances in my unit have brought comments from my superior to the effect that my performance has been poor.
5. My superior has become angry about budget variances in my unit.
6. I have had to explain to my superior budget items over which I have no control.

V. *Budgetary Feedback*

1. I receive a considerable amount of feedback about my achievement concerning my budget goals.
2. I am provided with a great deal of feedback and guidance about my budget variances.
3. My boss lets me know how well I am doing in terms of achieving my budget goals.

VI. *Budget Goal Clarity*

1. My budget goals are very clear and specific. I know exactly what my budget goals are.
2. I think my budget goals are ambiguous and unclear (reverse item).
3. I understand fully which of my budget goals are more important than others. I have a clear sense of priorities on these goals.

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An Analysis of Differences Between Non-major Oil Firms Using Successful Efforts and Full Cost Methods

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ABSTRACT: Subsequent to the issuance of FASB Statement 19 mandating the adoption of successful efforts accounting in the oil and gas industry, a number of full cost companies appealed to the SEC to permit the continued use of full cost accounting. One of the primary arguments raised by these full cost companies was that companies using each alternative method are so different that dual accounting methods are appropriate. The full cost companies argued that they were more aggressive in exploration, newer, and in greater need of external funds than successful efforts companies. An analysis of data for companies using each method indicated that full cost companies were not more aggressive in exploration than their successful efforts counterparts. Full cost companies were more highly leveraged. This result indicates a relatively greater use of outside capital, but the cause of this greater use could not be determined.

In July 1977, the Financial Accounting Standards Board proposed the adoption of a uniform financial accounting rule in the oil and gas industry based on the successful efforts concept. The resulting Statement (SFAS 19) was adopted in December 1977. Opposition to SFAS 19 was unprecedented in intensity and resulted in appeals by full cost companies before several administrative and legislative bodies, including the Securities and Exchange Commission (SEC). One of the primary arguments advanced by these full cost companies was that there are significant differences between companies using each accounting method and that these differences would justify continued use of both accounting methods.

The debate raised the question of whether the recent trend towards elimination of accounting alternatives could be sustained and what basis would justify a determination that alternative accounting practices could be justified. Proponents of SFAS 19 argued that since the discovery of a dry hole was the same event for all companies, a uniform accounting treatment was necessary. For example, Staats noted:

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> We [the Comptroller General's Office] believe the standard setting process should eliminate accounting alternatives where the facts and circumstances are the same. While oil and gas producers do vary in size, breadth of ownership, and diversity, these differences do not change the relevant facts and circumstances surrounding their exploration and production transactions and do not justify different accounting concepts (U. S. Comptroller General, p. 2).

Like the FASB, Staats focused on the nature of the transaction, that is, the abandonment of a specific prospect should be treated in a uniform manner: one group of companies may not call the associated costs an asset while another group calls them an expense or loss.

The U. S. Department of Justice, however, suggested that the comparability argument should focus on the similarity or differences in the entity. They note:

> However, uniformity as a goal can only claim superiority where like entities are being compared. If two entities or groups of entities were significantly dissimilar, attempts to draw simple accounting comparisons would only confuse the analysis (U. S. Department of Justice, p. 18).

They go on to note that opponents of SFAS 19 have alleged that their companies are different because they are more heavily engaged in exploration than companies using successful efforts accounting and expressed concern that SFAS 19 could negatively affect competition and exploration in the industry.

To sustain the allegations that differences in entities exist that would justify the use of dual accounting methods, one must demonstrate that those differences are identifiable. Indeed, one would expect to be able to construct a model that would discriminate between the two groups of companies using the variables that have been advanced as justification for dual accounting methods. This paper presents an examination of the hypothesis that full cost companies are different from successful efforts companies along the dimensions suggested in testimony before the SEC.

Subsequent to the hearings, the SEC decided that neither full costing nor successful efforts could be supported. Instead, the Commission ruled that a new method of accounting must be developed for the industry based on recognition of the value of discovered reserves. Since an interim period of at least three years has been allowed for the development of the new accounting method, and since there is strong opposition to the use of value-based financial statements, it is likely that this accounting issue will remain unresolved for some time. The resolution of this accounting controversy and the choice criteria that may be established as justification for alternative methods will, to a great extent, depend on further research and analysis. For this reason, an empirical test of the hypothesis that non-major petroleum companies using full cost or successful efforts accounting are significantly different along the dimensions suggested in testimony before the SEC is useful. The results should be viewed as possible inputs to policy makers' decision processes, and not as policy conclusions.

PROPOSED DIFFERENTIATING VARIABLES

As indicated in analyses by Sunder [1976] and Myers [1974], the use of full cost accounting will, through the deferral of costs associated with unsuccessful prospects, tend to show higher and smoother earnings series for companies that are expanding their exploration activities. In addition to the effect of increasing income, companies expanding their exploration efforts will tend to show greater asset values and greater shareholders' equity due to the capitalization of unsuccessful prospect costs. To the extent that company managements perceive the need to report higher, smoother income and greater asset and equity values, it may be expected that companies with expanding exploration activities will employ full cost accounting.

In testimony before the SEC, many of the full cost witnesses indicated that they were, in fact, more aggressive in exploration than their successful efforts counterparts. In addition, they indicated that smooth earnings and greater asset and equity values were necessary to obtain new capital from debt and equity markets.[1] The full cost advocates also alleged that they tended to be smaller than the nonmajor successful efforts companies and, therefore, unable to diversify the risks of exploration as effectively. Finally, these full cost companies indicated that they were generally newer companies in the exploration business and, therefore, did not have a base of established producing properties which would provide sufficient revenues to reduce the relative income effect of the costs of unsuccessful prospects.

On the basis of the testimony before the SEC and the U. S. Department of Energy, four factors were derived which were considered to be dimensions for the differentiation between nonmajor full cost and nonmajor successful efforts companies. These factors are: (1) aggressiveness in exploration, (2) the need for external capital, (3) size, and (4) age.[2] Selection of the specific variables to represent each of these factors was also derived from materials submitted in the proceedings.

SPECIFICATION OF DISCRIMINATING VARIABLES

The measurement of aggressive exploration is a difficult task. In his testimony before the Department of Energy, Erickson indicated that aggressiveness in exploration may be measured by an examination of three variables:

1. offshore exploration on the outer continental shelves,
2. drilling to greater depth in onshore areas, and
3. drilling in remote or new onshore areas. [Erickson, p. 16]

Of these three variables, quantitative data on a per-company basis is available only on drilling depths. The average depth of exploratory wells was stated as one variable to aid in the determination of differences between full cost and successful efforts companies.

Exploration aggressiveness may also be measured in terms of the number of exploratory wells drilled relative to some measure of the size of the company. As asserted by a number of the full cost proponents, such companies commit a greater proportion of their resources to exploration. While direct data on funds spent on exploration were not available on an individual company basis for many companies, data on the number of exploratory wells drilled was obtained and used as a surrogate. Since the extent of exploration is likely to be affected by company size, exploration effort was expressed in relative terms by using each company's revenue as a deflator.

It was also asserted that successful efforts firms may do more development drilling rather than the exploratory drilling which is considered to be more consistent with providing an increased national energy supply. A development drilling ratio was constructed by dividing development wells by total wells drilled to represent this activity.

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[1] This point of view was supported by the testimony of several leading investment banking firms which underwrite substantial volumes of securities for companies in the oil and gas industry.

[2] It may be asserted that other variables may exist which would explain differences between the companies in a manner consistent with positive economic theory (*e.g.*, differences in incentive compensation plans, debt agreements and similar measures). While an investigation of these dimensions might provide a different insight from this study, the dimensions included in this analysis reflect the arguments presented before public policy-making bodies.

The size of company was also proposed as a method of differentiating between full cost and successful efforts companies. The company size argument holds that smaller companies are less able to diversify their portfolios of exploration prospects in a given period of time. However, they do face the same long-run economic equilibrium conditions as do larger companies. That is, their total costs must equal total revenues from oil and gas exploration. To represent this relationship properly for a smaller company, it was alleged an accounting method must allow the smaller company to average its unsuccessful efforts costs over several time periods. As was pointed out by Deakin [1978, pp. 72–80] and by the FASB [1978, pp. 3–25 and Appendix A] as well as by Deakin and Porter [1978, pp. 8–24], size alone is not a distinguishing characteristic between full cost and successful efforts companies.

Finally, it has been asserted by several investment bankers that full cost companies have a greater need for capital from outside investors than do the successful efforts companies [Frelinghuysen, 1978]. This allegation is based on a belief that full cost companies are newer and thus have a smaller base of established reserves on which to raise debt or equity capital. Moreover, the perceived aggressive exploration program leads to a greater need for funds to finance exploration. A greater exposure to adverse income effects from unsuccessful exploratory efforts exists for these firms under successful efforts accounting because the firm has relatively more of its assets employed in exploration efforts.

Frelinghuysen [1978] presented data intended to show that full cost companies made greater use of external capital markets and that, in the aggregate, their ratio of capital expenditures to internally provided resources was greater than for their successful efforts counterparts. Other full costers testified that since they were newer companies and more aggressive in terms of their commitment to exploration, they had a greater need for access to external capital markets. Full cost accounting is alleged to enhance a company's ability to obtain external capital at a reasonable cost because full costing provides greater reported asset amounts and more stable earnings numbers. While these arguments are contradictory to the concept of market efficiency and contain a degree of circularity, they contain some plausibility since it is not possible to reconcile the earnings and reported asset numbers across methods. It may also be posited that management will change the way it acts if it perceives adverse effects from the accounting change even if such effects are not real (see Rappaport and Prakash [1975]). Moreover, the U.S. Justice Department [1978] and the U.S. Federal Trade Commission [1978] indicated that the issue of differential need for funds warranted consideration in the SEC's deliberations.

The components of the relative need for funds argument give rise to three additional variables along the dimensions suggested by Frelinghuysen: (1) age of company, (2) debt as an indicator of the extent to which the company has leveraged its activities, and (3) relative capital expenditures. The company age was obtained as one variable. Since reported operating cash flow data have different interpretations for full cost than successful efforts companies due to the different treatment of unsuccessful prospect costs, it is not possible to compare the groups on the basis of a debt-to-cash-flow ratio.[3] Moreover, for an individual firm, debt may be raised on only an infrequent basis. Thus, comparisons based on debt raised in a period to funds flows in that period would not be meaningful. The ratio of long-term debt outstanding to revenue was used as a surrogate measure of leverage. Relative capital expenditures were determined according to the relationship of those expenditures to revenues for scaling purposes.

The list of variables used for the analysis is presented in Table 1. There are seven descriptive variables, of which four have revenues as either a numerator or denominator of the ratio. The problems which may arise from the use of variables constructed in this manner have been described by Sunder and Lev [1977]. However, attempts to conduct this analysis without adjusting related statistics for size differences resulted in discriminant models that had little statistical significance and less ability to differentiate between companies than the models used in this research. Moreover, the correlation between each of the specific components of the constructed variables and revenue was so great that one cannot determine whether the lack of ability to discriminate is due to an absence of differences between the two groups of companies or whether size alone is not a good variable for discrimination purposes. *A priori* evidence would support the latter reason.

TABLE 1

DISCRIMINATING VARIABLES

Indicators of aggressiveness in exploration
- Average depth of exploratory wells
- Number of exploratory wells/revenues
- Development wells/total wells

Indicators of need for external capital
- Debt/revenue
- Capital expenditures/revenue

Size indicator
- Revenue

Maturity or age variable
- Age of company in years

CONSTRUCTION OF THE MODEL

A determination of differences between companies that would suggest that alternative accounting methods are appropriate must be viewed on both a theoretical and empirical level. It may be posited that one or more variables can each be used to distinguish between companies. Alternatively, although each of the variables may not be significant in a statistical or theoretical context when taken alone, some arithmetic combination of the variables may present compelling evidence of differences. In the former case, logical arguments must be developed to show why each variable alone is indicative of differences between companies that are sufficient to allow continuation of dual methods. In the latter, multivariate case, the logical arguments must be developed on the basis of the effect of the variables taken together.

For purposes of the research, it is hypothesized that one can distinguish full cost and successful efforts companies on the basis of aggressiveness in exploration, perceived need for access to public markets, size, age of company, and relative extent of development drilling. Multiple discriminant analysis (MDA) has frequently been used in the literature to test hypotheses which seek to distinguish between groups on the basis of one or more predictor variables [Eisenbeis, 1977]. The technique appears suitable to construct a model for attempting to distinguish full cost companies from successful efforts companies using the variables suggested in this article. A model constructed using MDA may be analyzed by examining the significance of the model and of each of the predictors included in the model.

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[3] For a successful efforts company, operating cash flows are net of unsuccessful prospect costs, whereas for the full cost company, operating cash flows are reported before deduction of unsuccessful prospect costs. The full cost companies include these costs in additions to property plant and equipment. Sufficient data are not reported to permit an adjustment of the data from one method to another.

In addition, the constructed model should result in a better than chance classification of companies as full cost or successful efforts. Ideally, no companies would be characterized along the aggressiveness, equity need, size, age and development well activity dimensions with one group of companies (*e.g.*, successful efforts) when the company is using the other method of accounting (*e.g.*, full cost).

In an empirical study, it is unlikely that such a pure classification is possible due to frictions in changing accounting method in response to changes in the company along the stated dimensions or due to other factors not captured in the model. However, departures from the ideal may indicate that these stated operating differences cannot be used to distinguish between companies. However, misclassifications may also be indicative of companies that did not choose their accounting method on the basis of the dimensions captured in the model or which have not changed methods in response to changes in their own operations. Establishment of a rule along the dimensions represented in the model may indicate that misclassified companies would be required to change accounting method, although it is not advocated that any model developed herein be used for requiring one (or another) accounting method.

There are a number of potential problems that can appear when multiple discriminant analysis is used for classification purposes. Eisenbeis [1977] noted that empirical data from a business environment may violate assumptions of multivariate normality and/or equality of dispersion matrices, and that sample classification rates derived using models based on the same data used to construct the model may prove overly optimistic. Since the sample size in this study was limited by data availability, tests of these assumptions could not be made. As an alternative, Beaver's [1968] dichotomous classification test was used to classify the companies on each of the model variables to provide a separate estimate of the ability to classify these companies.

SAMPLE SELECTION AND DATA GATHERING

Construction of the MDA model and subsequent testing required a selection of data that offered a reasonable chance of providing discriminating ability following the dimensions suggested in the testimony before the SEC. The oil and gas industry may be characterized as comprising a number of widely different segments that are difficult to compare directly [Deakin and Porter, 1978, pp. 8-22]. It appears that there are approximately 24 major integrated companies that engage in exploration, production, transportation, refining and marketing of oil and gas and related products. In most of these major companies, the impact of SFAS 19 would be relatively small. Moreover, the ability to differentiate between groups would be hampered because the majors employ successful efforts accounting with only few exceptions. In addition, the majors derive most of their revenues from sources other than exploration. Thus, ratios based on exploration activity relative to revenues would tend to be biased.[4]

A second group of companies engaged

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[4] Analysis was conducted using models that included major companies. As expected, revenue-related data were distorted, and the results of the discriminant analysis and the classification tests were almost entirely dependent on the size variable alone.

in exploration are the public utilities and pipeline companies. Due to mandated full cost accounting by the Federal Power Commission and by a number of state utility regulatory commissions, this group predominantly uses full cost accounting. As with the majors, exploration and production of oil and gas are generally a small part of these companies' activities. Data-gathering and comparative measurements would tend to be biased with the inclusion of this group in that these predominantly full cost companies would show relatively small exploration-to-revenue ratios.

Exploration is also carried out by a substantial number of diversified industrial companies. These companies are about evenly split in the use of each alternative accounting method, but data on the oil and gas exploration activities of these companies are often scant because their oil and gas operations are often not material in relation to their overall operations.

There are non-major oil and gas exploration and production companies that derive a substantial portion of their revenues from oil and gas operations even though they may have other activities as well (*i.e.*, refining, other extractive operations, and other minor diversified activities). Since this latter group provides the most likely source of relatively uncontaminated comparative data, attention was directed to these companies for data-gathering purposes.

The 1977 *Energy Management Survey* listed 127 oil and gas producers, including major companies. Data on company revenues, capital expenditures, debt, and the number of exploratory and development wells for 1976 were available for a total of 69 companies. Depth data for exploratory wells for these companies were obtained from the American Petroleum Institute/American Association of Petroleum Geologists' exploratory drilling tapes. Of the 69 companies, 16 were major companies as generally defined (*i.e.*, among the largest 24 companies in oil and gas exploration and having integrated oil and gas operations). Of the remaining 53 companies, 28 were successful efforts companies and 25 employed full cost accounting. A list of the companies by major/non-major classification and by accounting method is provided in Table 2.

TABLE 2

COMPANIES INCLUDED IN THE SAMPLE

Non-major Companies	
Successful Efforts Companies	*Full Cost Companies*
Quaker State	Husky of Delaware
Superior	Mesa
Louisiana Land & Exploration	Houston Oil & Minerals
Murphy	Tesoro
General American	Great Basins
Noble Affiliates	McCullough
Energy Reserves	Flying Diamond
Maynard Oil & Gas	Wainoco
Kerr-McGee	Mitchell Energy
Woods Petroleum	Coquina
American Petrofina	Inexco
Mapco	Dyco Petroleum
Hilliard Oil & Gas	KRM
Flynn Energy	Buttes Oil & Gas
Crystal	Galaxy
Eason	Petro-Lewis
American Quasar	Hamilton Brothers Petroleum
MGF	Universal Resources
Beard Petroleum	Patrick Petroleum
Crown Central	Williams Companies
Rainbow Resources	Argo
Marion Corp.	Worldwide Energy (WECO)
Ocean Oil & Gas	Amarex
Texas American Oil	Consolidated Oil & Gas
Ada Resources	Tejas Gas
United Refining	
Clark	
Gulf Energy & Development	

Using a similar definition, Deakin and Porter [1978, pp. 15–21] identified 99 successful efforts companies that were non-majors and were predominantly engaged in oil and gas exploration and production compared with 67 full cost companies with similar operating characteristics. The FASB [1978] identified 56 successful efforts "exploration and production" companies and 51 such full cost companies in the U.S. The resulting sample for this study represents, then, a substantial portion of companies engaged predominantly in oil and gas exploration. The selection bias that may have resulted due to data availability cannot be assessed and served to limit the generalizability of the results.

In addition, other differences between the companies in each group may appear, yet they are not accounted for in the variables included in the discriminant model. For example, there may be substantially more companies with refining operations using one accounting method. If the refining operations affect the variables used in this analysis, the reported results may indicate that the model is better at distinguishing between the companies than would occur without the disproportionate distribution of the unrelated refining operations.

The results of the data selection process should provide the greatest discrimination between full cost and successful efforts companies that is likely to be obtained. Since the quantity of available data precluded use of a holdout sample, the classification results may be viewed as more accurate than is likely to occur if the model were extended to other observations that are not a part of the sample. These limitations must be kept in mind when reviewing the results.

RESULTS OF MODEL DEVELOPMENT

Summary statistical data for the discriminant model which were developed from all of the variables listed in Table 2 are presented in Table 3. The results of model development indicate that the model is significant at the .01 level based on a chi-square statistic of 18.2. The canonical correlation coefficient for the model is .56 and may be interpreted similarly to R in multiple regression. Thus, although the model indicates that one may distinguish between full cost and successful efforts companies on the basis of a statistical model, the differences between companies explained by the model represent only a small portion of the total differences between companies.

Of greater interest, though, is the structure of the differences. A review of the computed means on each variable for each group indicates that *on average*, full cost companies are more aggressive in exploration, smaller, newer, more highly leveraged and spend more on capital expenditures per revenue dollar than do those in the successful efforts group. However, none of these differences is statistically significant except the difference in age, leverage, and ratio of capital expenditures to revenues.

In the discriminant model which includes all of the indicated variables, the relative importance of the individual variables in the model may be obtained by ranking the absolute value of the standardized coefficients. In this model, the most important variable is the ratio of exploratory wells to revenues. The greater this ratio, the more likely the company is using full cost accounting. However, the second most important variable is the relationship of development wells to total wells. The more development wells as a percentage of total wells, the more likely the company is a full cost company. These two variables result in conflicting signals, since the higher ratio of exploratory wells is indicative of aggressiveness in exploration, but the greater incidence of development wells to total wells is more indicative

TABLE 3

SUMMARY OF DISCRIMINANT MODEL DATA

Variable	*Means*		*Significance*	*Standardized Coefficient*
	SE Firms	*FC Firms*		
A. Average Depth	8247.00	9123.40	ns	−.13
B. Exploratory Wells to Revenue	.53	1.85	ns	−2.78
C. Debt to Revenue	.40	.76	.05	−.66
D. Capital Expenditures to Revenue	.38	.61	.05	.09
E. Revenue	289.64	145.88	ns	.16
F. Age	27.46	16.64	.05	.61
G. Development to Total Wells	.96	.95	ns	−2.69

(ns—not significant)

Group Centroids: SE Firms .63
FC Firms −.70

Correlation Matrix

(Letters correspond to the variable labels in the first part of this table.)

	A	B	C	D	E	F	G
A	1.00						
B	−.16	1.00					
C	−.05	−.10	1.00				
D	−.11	.21	.53	1.00			
E	−.02	−.12	−.30	−.39	1.00		
F	.01	−.19	−.20	−.37	−.33	1.00	
G	.17	−.95	.01	−.24	.21	−.19	1.00

of companies that are turning their drilling activity to less risky development activities. Since these two variables are highly, but inversely, correlated ($r=-.95$), it is not possible to draw conclusions based on these measures. In subsequent analysis, attempts were made to construct models that deleted one or both of these variables. When only one of these two variables was used, the model had no statistical significance and gave poor classification results. However, when both of the variables were excluded from the model, the statistical significance was improved and classification results were also improved. A model that included only the debt and the capital expenditures ratio gave results that were equally significant and had equal total correct classification rates, as did the model with all of the posited variables included.

From the standpoint of model development, then, it appears that full cost and successful efforts companies cannot be distinguished on the basis of measures of aggressiveness in exploration alone. The two groups are not significantly different on the basis of univariate analyses. The discriminant models which contain aggressiveness measures give mixed results when the models include other variables. Discriminant models which contain only exploration aggressiveness indicators are not statistically significant.

However, from the standpoint of model development it does appear that full cost and successful efforts companies can be distinguished by the differences in the ratio of their debt to revenues and in the proportion of each dollar of revenue which goes to capital investments of all types (*i.e.* exploration and non-exploration). Full cost companies are also generally younger than successful efforts companies, although neither group can be characterized as new. The mean age of the full cost group is 16.6 years.

RESULTS OF CLASSIFICATION ANALYSIS

The test of a discriminant model is the ability to classify companies compared to alternative classification methods. If the error rates arising from the use of the model are low, then one may have found dimensions along which rules could be established to classify companies for accounting rule-making purposes. Of course, the ability to do this depends on the assumption that companies are using the accounting method that is most appropriate for the economic conditions identified by the model as characteristic of the group to which the company belongs. Classification errors indicate that the company in one group (*i.e.*, successful efforts) has more of the characteristics of a company in the other group (*i.e.*, full cost) in terms of the factors captured in the model.

The results of the classification of companies in the sample for the model including all of the posited relevant variables are presented in Table 4(a). These results appear to indicate that while inclusion of all posited variables is statistically significant from the standpoint of model development, fully 28 percent of all companies in the sample have characteristics of companies using the opposite accounting method. The error rate for each group is slightly different with 32.1 percent of the successful efforts companies classified as full cost companies, and 24.0 percent of the full cost companies having characteristics more similar to the successful efforts companies in the sample.

TABLE 4

CLASSIFICATION RESULTS

(a) Model with all posited variables

		Predicted Group	
		Successful Efforts	*Full Cost*
Actual Group	Successful Efforts	19 (67.9%)	9 (32.1%)
	Full Cost	6 (24.0%)	19 (76.0%)

71.7% correctly classified overall

(b) Model with debt/revenue and capital expenditures/revenue variables

		Predicted Group	
		Successful Efforts	*Full Cost*
Actual Group	Successful Efforts	23 (82.1%)	5 (17.9%)
	Full Cost	10 (40.0%)	15 (60.0%)

71.7% correctly classified overall

When using only the debt and capital expenditure dimensions (in Table 4(b)), the overall error rate is the same (28 percent), but the distribution of the classification errors is quite different. While 17.9 percent of the successful efforts companies have characteristics of the full cost group under this model, 40.0 percent of the full cost companies are more like successful efforts companies on this set of dimensions.

THE DICHOTOMOUS CLASSIFICATION TEST

The dichotomous classification test calls for a ranking of each observation (firm) according to the value of the variable used for classification purposes. In this case, all 53 firms are ranked according to each one of the model variables. A cut-off is established according to the relative number of companies of each type in the population. Thus, for variables on which full cost companies are presumed to have greater values (such as drilling depths), the 25 highest ranked companies are considered classified as full cost companies and the remaining 28 companies are classified as successful efforts companies. The reverse holds for variables on which successful efforts companies are posited to have larger values (*e.g.*, age of company).

A classification matrix is prepared showing the companies classified correctly on the diagonal and erroneous classifications on the off-diagonal elements. The overall correct classification rate indicates the extent to which one could expect correct classification given an arbitrary cut-off value of a specific variable.

Results of the dichotomous classification test are presented in Table 5. In general, the test performed poorly on all of the variables except the debt/revenue ratio. The results using the debt/revenue ratio are slightly better than the results

TABLE 5

RESULTS USING DICHOTOMOUS CLASSIFICATION METHOD

(a) Average Depth

		Predicted Group	
		Successful Efforts	*Full Cost*
Actual Group	Successful Efforts	13	15
	Full Cost	15	10

43.4% correctly classified overall

(b) Exploratory Wells/Revenue

		Predicted Group	
		Successful Efforts	*Full Cost*
Actual Group	Successful Efforts	18	10
	Full Cost	10	15

62.3% correctly classified overall

TABLE 5 (*Continued*)

(c) Debt/Revenue

		Predicted Group	
		Successful Efforts	*Full Cost*
Actual Group	Successful Efforts	21	7
	Full Cost	7	18

73.6% correctly classified overall

(d) Capital Expenditures/Revenue

		Predicted Group	
		Successful Efforts	*Full Cost*
Actual Group	Successful Efforts	19	9
	Full Cost	9	16

64.0% correctly classified overall

(e) Revenue

		Predicted Group	
		Successful Efforts	*Full Cost*
Actual Group	Successful Efforts	16	12
	Full Cost	12	13

54.7% correctly classified overall

(f) Age

		Predicted Group	
		Successful Efforts	*Full Cost*
Actual Group	Successful Efforts	17	11
	Full Cost	11	14

58.5% correctly classified overall

(g) Development Wells/Total Wells

		Predicted Group	
		Successful Efforts	*Full Cost*
Actual Group	Successful Efforts	14	14
	Full Cost	14	11

47.2% correctly classified overall

using the discriminant model.[5] It appears that the extent to which full cost companies tend to be more highly leveraged may be considered the best classificatory variable for differentiating between the two groups, or is at least as good as models composed of more than one of the posited predictors.

This observation confirms the results of the discriminant analysis in that the ability to differentiate between full cost and successful efforts firms on measures of aggressiveness in exploration, size, or age cannot be supported by this analysis. With two exceptions, the classification rates obtained in the dichotomous classification test are not statistically better than those obtainable by random assignment. The ratio of capital expenditures to revenues is significant at the .05 level and provides a 64.0 percent overall correct classification rate for the sample data. The debt/revenue ratio provides the greatest ability to classify. Although there is still an error rate of 26.4 percent, the classifications are significantly better than obtainable by random assignment (at the .01 level using a chi-square test).

LIMITATIONS AND CONCLUSIONS

The results of this study depend on the analyses conducted on the sample data and are limited thereby as noted in the discussion. The variables selected were designed to represent dimensions along which discrimination between companies using alternative accounting methods were posited at the SEC hearings on SFAS 19. It may well be that the persons appearing at the hearings based their presentations on dimensions which were designed to appeal to the Commission and other interested parties rather than on dimensions which might be deduced from a positive economics framework. Nonetheless, the position papers of the U.S. Department of Justice, the U.S. Department of Energy and the U.S. Federal Trade Commission indicated concern that SFAS 19 might discriminate against full cost companies because of differences between entities along the dimensions cited. Investigation of the empirical validity of the arguments may be useful to support or refute the arguments advanced.

Keeping the limitations noted in the paper in mind, it appears that the hypothesis of ability to distinguish companies in the oil and gas business on the basis of accounting method using indicated measures of aggressiveness in exploration cannot be supported. However, it does appear that discrimination can be supported on the basis of debt leverage and capital expenditure levels or on the basis of a combination of these two variables with measures of age and aggressiveness in exploration.

The results of this test indicate that it would be difficult to establish a rule for companies to choose between full cost and successful efforts based on the dimensions indicated in testimony before the SEC without requiring a substantial number of companies to switch method. The dimension which appears to offer the greatest ability for discrimination (debt ratio) appears counter-intuitive as a basis for the formulation of asset accounting rules.

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[5] It should be noted that the lowest-ranked value of the full cost companies on this ratio equaled .4441, while the highest value of the ranked successful efforts companies was .4400. The range for the debt/revenue ratio was from 0. to 2.6875. Moreover, the dichotomous classification method forces the classifications into the same membership proportions as is known *ex post* while the discriminant classification allows the relative proportions to vary. Therefore, it would appear that the difference in classification rates between the debt/revenue ratio alone and the discriminant model is not significant in an empirical sense.

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Value and Events Approaches to Accounting: An Experimental Evaluation

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ABSTRACT: This paper presents the results of an empirical test of the value/events hypothesis first presented by Sorter. The paper places the value and events approaches to information generation in an overall information systems framework, by simultaneously examining the accounting approaches and the psychological type of the decision maker. The experimental results indicate that Sorter's events approach has considerable merit when coupled to the psychological type of the decision maker.

INTRODUCTION

George Sorter [1969] began the first investigation into two fundamentally different approaches to the role of accounting in the presentation of information to decision makers. His aim was to stimulate research into the value and events approaches to accounting. Sorter characterizes the "value" approach as the traditional one used by accountants. This approach assumes that

> users' needs are known and sufficiently well specified so that accounting theory can deductively arrive at and produce optimal input values for used and useful decision models. [Sorter, 1969, p. 12]

He and other proponents of the "events" approach take a different viewpoint based on the premise that often the accountant may know little about how data are used by the managers. They suggest that

> the purpose of accounting is to provide information about relevant economic events that might be useful in a variety of possible decision models. . . . Instead of producing input values for unknown and perhaps unknowable decision models directly, accounting provides information about relevant economic events that allow individual users to generate their own input values for their own individual decision models. [Sorter, 1969, p. 13]

Sorter also emphasizes that one major difference between the two approaches lies in the level of aggregation which is to be provided in information presentation. Use of the "events" approach suggests that less aggregation is appropriate by the information provider because the user should determine the nature and

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extent of the desired level of aggregation.

The "events" approach was analyzed in more detail by Johnson [1970]. Johnson commented further on the aggregation issue, placing it in a general context of summation. He delineated three types of summation: (1) aggregation, both temporal and sectional; (2) combination; and (3) composition. He also suggested that verification of the "events" approach would require empirical studies. Various other authors such as Colantoni *et al.* [1971], Lieberman and Whinston [1975], Haseman and Whinston [1976], and Everest and Weber [1977] proposed models and computer implementation structures for the "events" approach.

Although it has now been ten years since the publication of Sorter's paper, to date there has been no attempt to place these two accounting approaches within the general context of an information system framework, such as the one proposed below by Mason and Mitroff:

> An information-system consists of at least one PERSON of a certain PSYCHOLOGICAL TYPE who faces a PROBLEM within some ORGANIZATIONAL CONTEXT for which he needs EVIDENCE [i.e., information generation] to arrive at a solution (i.e., to select some course of action) and that the evidence is made available to him through some MODE OF PRESENTATION. [1973, p. 475]

The nature of the decision environment may affect the decision on which approach to adopt. For example, the "value" approach may be more suitable for systems of a programmable nature where it is relatively easier to understand the decisions made and decision models which are used. The "events" approach may be more appropriate in the more non-programmable types of situations where the decisions are less structured.

The psychological type of the decision-maker may also affect the decision on which approach, "events" or "value," to adopt. This reasoning is supported by a recent report of the American Accounting Association Committee on Human Information Processing. This report proposes three basic strategies for improving human decisions. One is relevant to this study: "... (1) The information set upon which such decisions are based may be altered. This alternative emphasizes information search and selection.... All three alternatives require an understanding of the variables and processes involved in human information processing and decision making" [1977, pp. 1–2]. This paper, following the above strategy, experimentally evaluates the "value" and "events" approaches within the context of the psychological type of the decision maker. An understanding of how psychological type may influence information use behavior is not only of academic interest. Such studies could eventually lead to better information system design based on an understanding of the users' characteristics.

Another aspect not yet developed adequately is the relative value or effectiveness of the two approaches. Although the above authors who have discussed the "events" approach present arguments as to its advantages over the "value" approach, there has been no empirical comparison of the two approaches to validate their prior beliefs. The nature and effectiveness of the two approaches may be analyzed by conducting experimental studies under various organizational and managerial settings. It is the purpose of this paper to present an experimental investigation evaluating certain aspects of the "value" and "events" approaches in an inventory control/production scheduling environment.

EXPERIMENTAL FRAMEWORK

Two variables of the Mason and Mitroff framework [1973]—one relating to information generation and the other relating to psychological type of the decision-maker—were analyzed. The following variables of the framework were held constant:

(1) the organizational context—an inventory/production decision-making setting; and
(2) the mode of presentation—an interactive on-line information system.

A simulation experiment was designed to determine the extent of the relationship between two independent variables and three dependent variables. The independent variables were:

(1) Method of information generation, "value" or "events" approach; and
(2) Psychological type of the decision-maker, low or high analytic.

The dependent variables were:

(1) Profit performance,
(2) Time spent for decision making, and
(3) Report request behavior.

In order to test the relationships between the independent and dependent variables, a production decision making environment which depicted a simple yet realistic business setting was chosen. This application is at the operational level of management. It is reasonably understood, although not completely programmable, and is an important application common to many businesses. A combination production level and inventory ordering decision problem for decision makers in a multi-period game was developed. At each decision point subjects were presented with certain types of reports and made decisions. To minimize observer bias, experimental data were automatically captured by computer programs which were part of the simulator depicting the decision-making setting. The data gathered from this experimental setting were used to test the relationships between the independent and dependent variables. In the next sections, the variables, their hypothesized relationships, and the experimental setting are discussed.

THE INDEPENDENT VARIABLES

One of the independent variables concerns information generation, while the second concerns the psychological type of the decision maker.

(1) *Methods of Information Generation*

The different methods of information generation used in the experiment were:

(a) a database inquiry capability ("events" approach; see Appendices 1 and 2), and
(b) structured/aggregate reports ("value" approach; see Appendix 3).

Lieberman and Whinston [1975] provided the following description of the events-accounting information system. The Events-Accounting Information System proposes to allow users to make inquiries of a database. An inquiry is a request for information; a database is simply the collection of raw data. Inquiries may range from the simple retrieval of data items as they were originally stored, to advanced inquiries that retrieve and process data items according to a set of user-stated conditions.

The data inquiry system used in the experiment is a relatively simple one (see

Lieberman and Whinston [1975] and Everest and Weber [1977] for descriptions of more sophisticated "events" approaches). For example, this database inquiry system does not have the capability to model complex data relationships, such as hierarchies or networks.

The database inquiry capability (Appendix 1) allows the user to choose any or all of the data elements contained in the database. The user may look at whatever information elements he/she thinks is useful for solving the problem at hand. In this system there is no aggregation over time; every piece of data generated by the simulated decision setting is available to the user. The user is not told which of the data elements are more useful or valuable than the others nor in which order to examine the data elements. In order to acquire any one of the data elements shown in Appendix 1, the user has to indicate the desired data category and time range (from 20 to 50 past days). Appendix 2 shows a sample demand history output for 20 days.

The structured/aggregate report (Appendix 3) contains aggregate information (from 20 to 50 past days). This type of summation is [Johnson, 1970, p. 645] a temporal aggregation; for example, the sales are simply summed to get the aggregate for the period desired. Every data element in this report could be generated by a person who had access to the database inquiry system, but obviously the reverse is not possible because of the temporal aggregation. The structured/aggregate report is broken down into four main sections. The first three sections are designed to directly fit into the decision-making structure of the experimental game. Part I, the "raw materials" section, is useful for making raw material order point/order quantity decisions. Part II, the "finished goods" section, is useful for making the production-scheduling decisions. Part III, the "sales during period" section, gives the user an indication of the nature of the demand distribution for the firm's product which is useful for both inventory acquisition and production-scheduling decisions. Part IV, the "revenue and cost" section, is an indicator of decision performance. In order to acquire the structured/aggregate report, the user had to indicate the desired time range (from 20 to 50 days). Since this report did not fit on a single cathode ray tube (CRT) display screen, Part I-III were shown first. When the user hit the return key at the terminal, Part IV appeared (see Appendix 3).

The structured/aggregate report has a certain structure that we, as information providers, think is "useful" under the given decision-making environment. This report generates information based on the information provider's concept of the decision environment and is classified under the "value" approach described by Sorter [1969]. The database inquiry system relates to the same decision environment. The relevant data included in both systems are determined by the decision environment. The difference between the two approaches is a matter of degree. With the database inquiry system, the fact that the data are neither structured nor aggregated implies less knowledge on the part of the information provider concerning the perceived decision model of the user. It is expected that this system is more representative of the "events" approach described by Sorter. The structured/aggregate report has a certain organization that implies more knowledge on the part of the information provider about the decision model of the user. Therefore, this information system is more representative of the "value" approach described by Sorter.

(2) *Psychological Type of the Decision-Maker*

> What is information for one type [of decision-maker] will definitely not be information to another. Thus, as designers of MIS [Management Information Systems], our job is not to get (or force) all types to conform to one, but to give each type the kind of information he is psychologically attuned to and will use most effectively. [Mason and Mitroff, 1973, p. 473]

A survey of the human information processing research findings (see Driver and Mock [1975] and Benbasat and Taylor [1978]) dealing with decision-making styles, tends to support Mason and Mitroff's contention that the psychological type of the decision-maker should be considered in information system design. For example, Mock *et al.* [1972] found that decision styles explained variances in information value; Dermer [1973a] found that subjects with less tolerance for ambiguity prefer more information; and Huysmans [1970] found that decision-making styles influence the type and content of the reports chosen by decision makers.

The psychological type variable which is analyzed in this experiment was the low/high analytic dimension, which has gained most attention in experimental research (see Huysmans [1970]; Mock *et al.* [1972]; Doktor and Hamilton [1973]; Benbasat and Schroeder [1977]; and Vasarhelyi [1977]). This dimension focuses on how decision makers organize their decision-making activities. Low analytic individuals tend to use hypothesis testing, feedback, and trial-and-error approaches to reach solutions. High analytic individuals tend to approach a problem by structuring it in terms of some planned method which will generally lead to a likely solution.

The Embedded Figures Test [Witkin *et al.*, 1971] measures an individual's ability to break a complex figure into its simpler parts. It was developed to measure two behavioral styles called field dependence and field independence.

> In a field dependent mode of perceiving, perception is dominated by the overall organization of the field; there is relative inability to perceive parts of a field as discrete. This global quality is indicative of limited differentiation. Conversely, a field independent style of perceiving, in which parts of a field are experienced as discrete from organized background, rather than fused with it, is a relatively differentiated way of functioning. . . . [Witkin *et al.*, 1967, pp. 291–292]

Although the basic task in the Embedded Figures Test seems to be associated with perception, Witkin *et al.* [1962, 1971] state that the ability to "break-up" a basic configuration will manifest itself not only in straight forward perceptual situations but in problem solving situations as well. These contentions are supported by findings which show that:

> (a) The significant relation frequently reported between measures of field dependence and total standard intelligence test scores is "carried" largely by those portions of intelligence tests which require analytical functioning. In other words, the relation is based on the expression of a particular style of field approach in both. [Witkin *et al.*, 1962, p. 80]
>
> (b) The finding of a linkage between analytical and structuring abilities suggested that the cognitive style involved was even broader than implied by the "global-analytical" concept. This broader cognitive style may be described as follows: At one extreme, when the field is structured, there is a tendency for its organization, as given, to dictate the manner in which both the field as a whole and its parts are experienced; when the field lacks structure, experience tends to be global and diffuse. At the other extreme there is a tendency for experience to be delineated and structured, even when the material lacks inherent organization; parts of a field are experienced as discrete and the field as a whole as organized. . . . The cognitive-

> style concept approaches perceptual and intellectual activities from the perspective of the person engaged in them. Pursuit of this approach has demonstrated that an individual shows the same characteristic ways of functioning across these activities, suggesting that the classical division between the perceptual and the intellectual needs to be relaxed. [Witkin *et al.*, 1971, pp. 7–8]

Based on the broader interpretation that a field-independent style also implies higher analytical reasoning, Lusk [1973a], Doktor and Hamilton [1973], and Bariff and Lusk [1977] classified field-dependent subjects as low analytics and field-independent subjects as high analytics.[1] We used the same approach to differentiate between low and high analytic subjects. In addition, as suggested by Mock *et al.* [1972], a post-game questionnaire was used where subjects described their decision approach to test the validity of using the Embedded Figures Test as a measure of psychological decision-making style. The post-game questionnaire findings are supportive of the use of the Embedded Figures Test in a more extended interpretation. The subjects were asked to rate their decision approach on a seven-point scale which ranged from "highly stable, fixed strategy" on one end of the continuum to "highly flexible, changing strategies" at the other. Analysis of variance showed that the high analytic subjects indicated a more stable, fixed strategy approach compared to the low analytics (significant at the .01 level). This difference was attributable to psychological type only; *i.e.*, the information system did not contribute to a change in decision approach. This finding confirms the model of a high analytic who uses a relatively structured approach to solving problems.

THE DEPENDENT VARIABLES

(*1*) *Profit Performance*

Profit performance is one of the well-accepted goals when decision effectiveness or performance is discussed in an inventory/production setting. It is an economic measure of the impact of the information system. In the experimental game, profit performance was measured as the amount of sales revenues less production, carrying, ordering and raw materials costs (see Part IV in Appendix 3).

(*2*) *Time Spent for Decision-Making*

Time performance was measured by the amount of time which a subject devoted to information acquisition and decision making. Since managerial time is a valuable commodity, the objective of the information system designer is to design systems which, *ceteris paribus*, reduce decision time. Time performance often may conflict with profit performance. For example, a study by Chervany and Dickson [1974] has shown that, given statistically summarized data, decision makers made better quality decisions, but took longer to make them.

(*3*) *Report Request Behavior*

This variable was analyzed in two ways: number of reports requested and number of historical days of data per report request (from 20 to 50 days). There are several reasons why this dependent variable was of interest. The information system designer should understand the conditions (task, information system, and behavior) that lead to excessive requests for information. In general, as the amount of historical data available to a decision maker increases, so do the data processing and storage costs. More importantly, providing the manager with more data than necessary increases the managerial analysis time required, and may also create information overload which reduces the manager's capability to absorb or process the reports. Therefore, it is the designer's responsibility to know the information load which will suit the task and the user environment and especially how these factors relate to the user's psychological type.

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[1] Dermer has raised some objections to using this approach. The exchange between Lusk [1973b] and Dermer [1973b] would be of interest to researchers working in this area.

THE EXPERIMENTAL SETTING

Forty-eight subjects, all of whom were volunteers and interested in the problem, participated in the experiment. The subject population consisted of 24 accounting majors at the University of British Columbia, 20 members of the Faculty of Commerce and Business Administration, and four professional accountants. The professors and accountants had both the theory and practical business experience to operate effectively in the experimental game. Students enrolled in an advanced accounting seminar volunteered for the experiment. These students had the theoretical, if not the practical, background to make decisions in the given environment. The game was complementary to their previous classroom lessons. All of the students had the goal of joining professional accounting firms following their graduation.

Each subject acted as the inventory/production manager of a hypothetical firm which was simulated by a computer program. The interaction with the simulator was in conversational mode through Cathode Ray Tube (CRT) display units. Response time to subject requests was between one to three seconds. An interactive simulator of this type is superior to a batch system, since excessive turnaround times in batch systems may cause subject boredom and lack of interest in the experimental game. The decision setting used was a multiperiod decision-making game. The model depicted a setting where a firm buys raw materials, manufactures a product, and sells it daily to retailers.

The experimental game was divided into 15 decision points, where the subjects requested information and made decisions. There were 20 simulated days between each decision point, making the total duration of the experimental game equal to 300 simulated days. At each decision point, after they had looked at the historical reports, the subjects made three decisions: set an order point; set an order quantity; and set the daily production figures for the next 20 days. The subjects were not told the duration of the game to avoid end-of-game strategies. Each subject had the objective of maximizing the total profit of the firm. Subjects were provided with game instructions a week prior to their participation. The instruction set explained how the various cost elements were calculated and how the profit figures were derived. The only information not available to the subjects prior to the game was the nature of the two exogenous variables: demand and lead time.

Before the subjects played the experimental game, they were allowed a 45-minute practice session to familiarize themselves with the CRTs, and understand how commands were entered and reports retrieved from the simulator. This was done to reduce the learning effects that normally take place during the early stages of a game and which could reduce the validity of experimental findings. The demand and lead time distribution in the practice session were different from the ones in the actual game, and the subjects were made aware of this. On average the subjects took about two hours to play the experimental game (*i.e.*, make 15 sets of decisions).

The subjects were provided with historical information at each decision point before they made their decisions. The information made available to each subject depended on the treatment group. Each subject was aware of only his or her information system; the subjects were not told that other subjects had different information.

The subjects in the structured/aggregate group received only one report (see Appendix 3). The database inquiry subjects received detailed reports generated by the information system (see Appendix 1 for a list of these reports and Appendix 2 for an example). Both information systems allowed the subjects to review from 20 to 50 days' historical data at a time; however, only the detailed reports provided day-by-day data.

Detailed report requests were voluntary; each subject could request any report desired and thought to be necessary for determining problem areas and making decisions. The order in which the reports were requested was left up to the subject. Each subject viewed the reports one at a time, then decided either to request another report or to make a new set of decisions.

In order to get the student subjects interested in the game and have them making the best decisions possible, a monetary incentive scheme was devised. The 24 subjects having the best performances, that is, highest total profits, received a money prize which decreased linearly with the subjects' performance. The best performance was awarded $24, the second best $23, and so on down to the 24th best performance, which was given one dollar. This kind of a scheme was thought to be superior to one where only the first or first few performances were given prizes. If only one prize were given, most subjects would give up if they felt that they were not doing their best and had no chance of being the best performer. With 24 prizes, each participant had a chance to win, and since the winnings increased with better performances, it was assumed that the subjects would constantly be on the alert to make their best decisions. It was felt that it would be inappropriate to award the non-students in the same fashion. They were told that the top 10 would receive a prize.

RESEARCH HYPOTHESES

A) *Profit Performance Hypotheses*

> *Hypothesis 1:* There will be no difference in profit performance attributable to the method of information generation.

Proponents of the "events" theory have claimed the superiority of this approach, however, the production/inventory decision environment used in the experiment was relatively structured or programmable in nature. In such environments, it is easier for the information provider to understand and specify inputs for the user's perceived decision model compared to specifying them in non-programmable environments. We, therefore, expect the subjects with structured/aggregate reports to perform equally well as the subjects with database inquiry systems. In previous experimental work [Chervany and Dickson, 1974] in similar decision environments, it was found that subjects given statistically summarized information performed as well as subjects who were given non-summarized information.

> *Hypothesis 2:* High analytic subjects will have higher profit performance than low analytics.

An inventory control/production scheduling environment, because it is relatively structured, seems better suited for subjects of the high analytic psychological type. A structured environment is more readily modelable, and high analytics have greater aptitudes for structuring tasks. This reasoning is consistent with the broader view of analytics' capabilities in structured decision process [Witkin *et al.*, 1971, p. 7].

Hypothesis 3: There will be an interaction effect between the information systems approach and psychological type on profit performance.

Low analytics using the database inquiry system will have higher profits than their counterparts with the structured/aggregate reports. According to Witkin *et al.* [1962], low analytics exhibit "the inability to perceive parts of the fields as discrete." This inability will cause low analytics to have difficulty in comprehending the impact of individual elements of the structured/aggregate report, resulting in a lower profit performance. This reasoning is consistent with another study [Bariff and Lusk, 1977], which reported that low analytic decision makers preferred disaggregated reports (to graphs or histograms) with raw rather than transformed data. Witkin *et al.* [1971, p. 7] further state that the high analytics have the ability to "impose structure on a field and so perceive it as organized, when the field has little structure." High analytics can also experience in an articulated fashion and can perceive items as discrete from their backgrounds. Therefore, no profit differential is anticipated for the high analytic group between information systems.

B) *Time Performance Hypotheses*

Hypothesis 4: Subjects with database inquiry systems will spend more time in making decisions than subjects having structured/aggregate reports.

Since it takes more time to analyze the individual reports and integrate the data elements from a large number of individual reports, subjects given the database inquiry system will take longer to make decisions compared to subjects with structured/aggregate reports.

Hypothesis 5: High analytics will take less time to make decisions than low analytics.

The same reasoning used in Hypotheses 2 and 3 is applicable here.

Hypothesis 6: There will be an interaction effect between the information systems approach and psychological type on time performance.

It was previously hypothesized that the subjects using the database inquiry system will take longer to make decisions than the subjects using the structured/aggregate report, and that the structured/aggregate report is unsuitable for low analytics. Ordinarily, the structured/aggregate report should save the decision maker's time; however, the unsuitability of the structured/aggregate report for low analytics will cause them to take relatively more time in comprehending the impact of the individual elements. The structured/aggregate-high analytic subject combination will take the least amount of time, compared to all others.

C) *Report Acquisition Behavior*

The reports provided by the database inquiry system provide day-by-day historical information, whereas the structured/aggregate report does not provide this capability. A 50-day history report for subjects having the structured/aggregate treatment would confound the events which take place over three separate decision periods. Therefore, asking for a longer historical range when requesting a structured/aggregate report will result in a coarser information system. Consequently, the perceived value of additional history for these subjects is expected to be less, compared to subjects with the database inquiry system. For this reason the report acquisition behavior within the two sub-groups was analyzed separately:

(i) Subjects who received structured aggregate reports; and
(ii) Subjects who received the database inquiry system.

> *Hypothesis 7:* Under a structured/aggregate reporting system, low analytics will have more report requests than high analytics.

Witkin *et al.* [1962; 1971], suggest that low analytics will have difficulty in disembedding the required information in the structured/aggregate report. Because this report requires two display screens, the low analytics will have to repeat their information search; *i.e.*, in order to re-examine the first screen, they will have to make additional report requests (see Appendix 3).

> *Hypotheses 8a and 8b:* Under the database inquiry system, high analytics:
>
> a) will ask for more reports, and
> b) will ask for more days of historical data per request than low analytics.

As previously mentioned [Witkin *et al.*, 1971, p. 7], high analytics are more likely to impose structure on a field and so perceive it as organized when the field has relatively little inherent structure. Therefore, high analytics will be able to structure more pieces of data than low analytics.

STATISTICAL MODEL

The following model was used for statistical analysis of hypotheses 1–6:

$$Y=\beta_0X_0+\beta_1X_1+\beta_2X_2+\beta_3X_1X_2+E$$

where:

Y = the response variable: repre the resulting behavior of th pendent variable. The a model was run once for ea these dependent variables: p performance and time perf ance. The Statistical Packag the Social Sciences (SPSS) A sis of Variance (ANOVA) gram [Nie *et al.*, 1975] was for computations.
β_0 = the overall mean
β_1 = the main effect of psycholo type
β_2 = the main effect of inform generation method
β_3 = the interaction effect of the a variables
E = the experimental error term
$X_0 = 1$

$$X_1=\begin{cases}0 \text{ if low analytic}\\ 1 \text{ if high analytic}\end{cases}$$

$$X_2=\begin{cases}0 \text{ if structured/aggregate r} \\ \quad (\text{"value" approach})\\ 1 \text{ if database inquiry sy} \\ \quad (\text{"events" approach})\end{cases}$$

T-tests for differences in means were to test hypotheses 7, 8a, and 8b.

EXPERIMENTAL FINDINGS

Measurement of Psychological Type

Using the Witkin Group Embe Figures Test [Witkin *et al.*, 1971 subjects with scores of less than 14 classified as low analytics, and 35 jects with scores greater than or equ 14 were classified as high analytics.[2]

After the subjects were classifie their psychological type, one half o

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[2] The same cutoff point was used by Lusk and Doktor and Hamilton [1973]. Witkin *et al.* found 13 as a median. Studies of 481 business stu the Faculty of Commerce and Business Adminis at the University of British Columbia resulted in of 14.2.

TABLE 1

SUMMARY OF RESULTS

	Level of Significance	Hypothesis Supported	Description of Results
A) PROFIT PERFORMANCE			
H1: Information System	NS	yes	No profit difference between information systems.
H2: Psychological Type	.003	yes	High analytics had higher profits than low analytics.
H3: Interaction Effect	.020	yes	Low analytics with structured/aggregate reports had the lowest profit performance.
B) TIME PERFORMANCE			
H4: Information System	.001	yes	Subjects using the database inquiry system took more time to make decisions.
H5: Psychological Type	.048	yes	High analytics took less time to make decisions than did the low analytics.
H6: Interaction Effect	NS	no	No time difference related to interaction effect.
C) REPORT REQUEST BEHAVIOUR			
H7: Structured/Aggregate Report; Number of Reports Requested	.006	yes	Low analytics requested more structured/aggregate reports than high analytics.
H8a: Database Inquiry System; Number of Reports Requested	NS	no	No difference in number of reports requested.
H8b: Database Inquiry System; Number of Days of Historical Data per Request	.001	yes	High analytics asked for a greater number of days of historical data per request than low analytics.

low (high) analytic subjects were randomly assigned to the structured/aggregate report treatment, while the other half received the database inquiry system treatment.

Discussion of the Findings

The experimental findings are summarized in Table 1. Tables 2, 3, and 4 present the detailed findings.[3] The results in Table 1 are presented by categorizing the independent variables by dependent variable groupings.

As hypothesized, no differences in profit performance between information systems were found. It is clear that in this environment the "value" approach to accounting should produce at least as good results as the "events" approach, since it is possible for the information provider to understand and specify user information needs at the structured operational level. However, subjects using the database inquiry system took longer to make decisions. The disaggregated nature of the reports caused subjects to spend more time scanning the data.

The results indicated that psychological type had a strong impact in determining which of the two information generation approaches, "value" or "events," would be more suitable in the given decision setting. The findings show that structured/aggregate reports are better suited for high analytics, while the database inquiry system is better suited for

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[3] In order to find out if the findings shown in Table 1 would have been affected by the backgrounds of the subjects, we ran additional statistical analysis using background (student versus nonstudent) as a blocking factor. This analysis showed that nonstudent subjects, that is faculty and professional accountants, had better profit performances, took less time to make decisions, and requested fewer historical data. However, blocking did not effect the hypotheses-test outcomes shown in Table 1.

TABLE 2

AVERAGE PROFIT PER DECISION (000s)

	Structured/ Aggregate		*Database Inquiry System*			
Low Analytic	202.1	(7)	305.7	(6)	249.9	(13)
High Analytic	334.7	(17)	321.0	(18)	327.6	(35)
	296.0	(24)	317.2	(24)		

TABLE 3

AVERAGE TIME PER DECISION (seconds)

	Structured/ Aggregate		*Database Inquiry System*			
Low Analytic	4685	(7)	5435	(6)	5031	(13)
High Analytic	3387	(17)	5012	(18)	4223	(35)
	3766	(24)	5118	(24)		

TABLE 4

REPORT REQUEST BEHAVIOR

	High Analytic	*Low Analytic*
a) *Structured/Aggregate Reports*		
Average Number of Days of Historical Data Per Report Request	22.5 (17)	23.6 (7)
Average Number of Reports Requested Per Decision Period	1.29 (17)	2.03 (7)
b) *Data Inquiry System*		
Average Number of Days of Historical Data Per Report Request	42.5 (18)	29.3 (6)
Average Number of Reports Requested Per Decision Period	6.6 (18)	7.8 (6)

low analytics. In terms of profit, low analytic subjects who used structured/aggregate reports had the poorest performance.[4] The inability on the part of the low analytics to "break up" the structured report to understand the impact of the individual elements would cause this result.

Furthermore, the low analytics with the database inquiry system performed as well as the high analytics with this system. This finding is consistent with another study [Bariff and Lusk, 1977] which reported that low analytic decision makers (as measured by the [Witkin *et al.*, 1971] Group Embedded Figures Test) *preferred* disaggregated reports. Therefore, experimental findings support the notion that low analytic subjects both prefer and perform better with disaggregated reports. High analytic subjects performed equally well in terms of profit with either system.

High analytics who utilized the database inquiry system asked for 50 percent more days of historical data per report request than their low analytic counterparts. This result did not occur with the aggregate/structured report (see Table 4). Low analytics, when given the structured/aggregate report, requested 50 percent more reports than their high analytic counterparts. Both groups asked for about 20 days of history per request, indicating that they understood the confounding effect of overlapping decision periods, as stated under the discussion of report acquisition behavior hypotheses (see Table 4).

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[4] The Scheffé method [Neter and Wasserman, 1974, Chapters 18 and 19] for contrasts was used to compare the mean profit level of low analytics using the structured/aggregate report to the combined average of the three other cells (see Table 2). The level of significance was .01.

CONCLUDING COMMENTS

The results of this study on a comparison of the "value" and "events" approaches to providing accounting information contribute additional evidence to support the findings of previous research that the psychological type of the decision maker has an impact on information system design. These results are of interest both to practitioners and academics.

The Sorter hypothesis in the operational level inventory control/production scheduling area was examined in this study. For this type of relatively programmed decision environment, the structured/aggregate reports ("value" approach) did not lead to better profit performance but were preferable, in general, because they led to less decision-making time. However, the findings indicate that the psychological type of the decision maker is an important factor in determining what type of information system to provide. Structured/aggregate reports are preferable for high analytic decision makers, and database inquiry systems ("events" approach) are preferable for low analytics.

In addition to psychological type, the information provider needs to consider the decision environment as a contributing factor in the design process. As the environment approaches the programmable end of the decision continuum or as the uncertainty in the decision environment decreases, the "value" approach seems warranted. On the other hand, as uncertainty about the controllable factors in the environment increases or if the decision-making process is not well understood, the "events" approach may be more suitable. These assertions should be tested in future research.

The findings concerning the Sorter "events" hypothesis are a useful first step. Although the database inquiry system in this particular environment was not found to be superior overall, further research in this area is necessary. A full test of the Sorter hypothesis which examines the "events" approach at strategic, tactical, and operational levels of the organization plus the programmed/non-programmed decision continuum would be desirable. Another research area would be to examine the impact of different design approaches to the "events" theory, such as the relational approach suggested by Everest and Weber [1977] versus the hierarchial approach suggested by Leiberman and Whinston [1975]. There have been quite a number of papers written in this area without corresponding research studies to evaluate the different approaches, which leads us to conclude that a comprehensive analysis of the "value" and "events" theory would be a valuable contribution to accounting research.

APPENDIX 1

DATA ELEMENTS AVAILABLE IN THE DATABASE

1. Demand History
2. Lead Time History
3. Inventory of Raw Materials on Hand
4. Inventory of Finished Goods on Hand
5. Raw Materials Ordered
6. Raw Materials Received
7. Quantity of Demand Lost
8. Quantity of Goods Produced
9. Quantity of Back-orders Placed
10. Quantity of Outstanding Back-orders
11. Quantity of Outstanding Orders
12. Sales History
13. Raw Materials Carrying Costs
14. Finished Goods Carrying Costs
15. Ordering Costs
16. Receiving Costs
17. Profit Before Taxes
18. Production Costs
19. Back-ordering Costs
20. Total Costs

APPENDIX 2

REPORT NO. 1 DEMAND HISTORY PERIODS 1 TO 20

1. 310
2. 325
3. 293
4. 310
5. 317
6. 304
7. 318
8. 330
9. 324
10. 318
11. 319
12. 313
13. 306
14. 317
15. 327
16. 311
17. 331
18. 305
19. 313
20. 336

APPENDIX 3

PERIODS 1 TO 20

SCREEN 1

I. RAW MATERIALS (RM)		
RM Inventory—Beginning		1,000
RM Received:		
+RM Orders Outstanding—Beginning	0	
+RM Ordered during Period	6,000	
−RM Orders Outstanding—Ending	1,800	4,200
RM Available for Production		5,200
Less RM Used in Production		4,960
Ending Raw Materials Inventory		240
NOTE: Average lead time was 6.44 days.		
II. FINISHED GOODS (FG)		
FG Inventory—Beginning	500	
+Production	4,960	
FG Available for Sale	5,460	
−Sales	5,460	
Ending Finished Goods Inventory	0	
III. SALES DURING PERIOD		
Back-orders—Beginning	0	
+Demand during Period	6,327	
Total Demand during Period	6,327	
−Back-orders—Ending	329	
−Lost Sales during Period	538	
Sales during Period	5,460	

SCREEN 2

IV. REVENUES & COSTS ($)		
Sales Revenues		1,638,000
Raw Material Carrying Costs:	611	
Finished Goods Carrying Costs:	1,409	
Ordering Costs:	1,000	
Receiving Costs:	1,200	
Raw Materials Used Costs:	421,600	
Back-ordering Costs:	480	
Production Costs:	831,289	
Total Cost:		1,257,589
Profit before Texas		380,411

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Owners' Equity, The Anachronistic Element

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ABSTRACT: An exposition of the principles of division, nomenclature, and definition is undertaken, as synthesized from other disciplines such as logic, biology and social science. Applying these principles to the credit side of a balance sheet it becomes clear that the existing basis of classification for the credit side and its coordinate subdivisions is deficient. The concept of equity does not provide a basis for articulating categories that are exhaustive and mutually exclusive. The rationale explaining these categories is contradictory, internally inconsistent and invalid. A proposal is made for a new basis of classification. It is based upon a pervasive characteristic possessed by all items on the credit side of a balance sheet; they represent sources of capital invested in recorded assets. Sources of capital are in turn, demarcated into transitory and standing sources.

One of the most deep-seated and incontrovertible concepts embraced by accounting theory is that of "owners' equity." It is a concept that seems to be held universally, there being little attention directed specifically to its critical evaluation in the accounting literature. The FASB *Conceptual Framework* Discussion Memorandum [1976, par. 187–191] presents the element of owners' equity in a way that makes it appear closed to discussion from the outset, except for how it is affected by income determination. Elsewhere in the literature, the concept is also generally accepted as a truism. Owners' equity is a subset of the extant classification system employed in accounting. It is not, however, a part of the only conceivable basis for classification and so its validity, as well as that of the system of which it is a subset, ought to be scrutinized and evaluated.

In the sections that follow, an analysis of the process of constructing and employing classification systems will be undertaken. The conditions that should be met by this process are stated as principles of division, nomenclature, and definition. The concept of equity, and particularly owners' equity, is then examined in light of the tenets of classification and typology theory. Finally, a proposal is offered for a different classification scheme.

CLASSIFICATION AND CATEGORIES

Even though the process of classification and the use of categories is pervasive in accounting, there has been less effort devoted to their systematic analysis and theoretical rationalization than in many other disciplines. An abundant literature on this topic exists in anthropology [Washburn, 1963], biology [Blackwelder, 1967; Simpson, 1967], logic [Searles, 1968], and the social

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sciences [Hempel, 1963]. There are theories and principles *apropos* to accounting that can be borrowed to its advantage. A synthesis follows.

The subjects with which we work and that are to be classified are discrete, objective events or units. They are known as transactions in accounting and specimens in the natural sciences. Each object that is a candidate for classification is unique; in a sense, every single object is somehow different from every other. Were there no facets of objects that correspond to those of other objects, classification would not be possible. It is the correspondence of some feature, attribute, or property between objects that permits grouping and makes possible the ensuing generalizations of description and prediction. An objective of description is to indicate the relationship, by kind and degree, between groups or classes. That, in turn, implies the creation of at least two, and possibly several coordinate categories, each forming an enclosure for objects with a correspondent attribute. The attribute that demarcates and distinguishes one coordinate category from another is known as its *differentia*. Thus, a particular attribute serves both to unite some objects as well as to segregate those allied objects from other congregations.

If all objects were strictly viewed as being unique, it would be difficult to attach significance to their observation or measurement. They take on far more significance when comprehended as the constituency of a population that is related by some common feature and identified as belonging to a category. Because of the multiplicity of characteristics possessed by objects, it is possible to divide a population into subsets based upon a commonality of still other characteristics and for which lower-order categories are then created. This is accomplished by specifying additional attributes to that which initially established the higher-order category. A lower-order category, therefore, is based upon and implies population members that possess both a correspondent attribute that makes them part of the higher-order population, and a *differentia* attribute that distinguishes them from those members in the other lower-order category.

A hierarchic system of categories is formed by expanding the number of specified, identifying characteristics that a population to be classified must possess. The more extensive the specification of characteristics, the narrower in scope a category becomes and the more exactingly described is its member population. And so descriptive power is enhanced. At one extreme, each object could be classified in a category based on all of its characteristics. One category for every single object would result, providing information virtually devoid of its power of generalization. At the other extreme, were only a single category established for all objects, it would be so lacking in its power of specificity as to be virtually devoid of informational value.

Exactly what constitutes an optimum number of categories, and how are the characteristics selected that will serve to distinguish population members? The selection of distinguishing attributes hinges on how the information is to be employed. Any one of a number of different attributes possessed by an object may be chosen to serve in some special inquiry. Soil possesses a pH factor that is of importance to a farmer, a mineral content that is of importance to a metallurgist, and a weight-bearing capacity that is of importance to an architect. User needs and interests determine which characteristic or attribute of an object is to be identified. Similarly, the number of categories in a system is a function of the nature and objective of the activity that brought about observation of classifiable objects in the first place, subject to the requirements of *systematic fruitfulness* and *parsimony*. Categories will be fruitful if they facilitate sound descriptive generalization and serve well in the process of prediction. The fewest meaningful or significant major categories possible should be created to cover the greatest number of observations if the mandate for parsimony is to be fulfilled. The structure of a classification system is not inviolable, however. Change can create the need for a different system or basis of classification; change in the form of new knowledge, differing circumstances, phylogeny of population members, *etc.*

Certain principles apply to categorization in addition to those of systematic fruitfulness and parsimony:

1. Categories must be exhaustive, or comprehensive. Each and every member of a population can be classified in one of the categories that have been established. All of the sub-categories add to the total of the next highest order of class. Ideally, then, there ought to be no objects left over, or incapable of being classified.
2. Each object ought to be classified in only one category. Coordinate categories should be mutually exclusive.
3. A coordinate category should be differentiated on the basis of a single characteristic, or *fundamentum divisionis*. The basis of division should be explicitly stated and of central importance to the purposes of the activity.

As an example, biologists have devised a classification system for the animal kingdom [Collingwood, 1965, p. 30]. The principal category exhaustively includes all animals and will not include any vegetables or minerals. Articulating subcategories (subphylum) further divide certain animal members in accordance with whether they have a spinal column into vertebrates (with backbone) and invertebrates (without backbone).

NOMENCLATURE AND DEFINITION

A concomitant aspect of division, or category creation, is their designation with appropriate nomenclature. There are certain principles that apply to nomenclature and the definition of terms,[9] or titles used in classification systems. Clearly a category must have an appelation, or descriptive label for identification, differentiation, and analytical purposes. These designative titles, or terms, have semantic implications that are important to accounting theory. In addition, the designative terms used to label categories must be defined as a corollary aspect of a classification system. Let us examine the requirements for category titles and title definitions in that order.

Linguistic rules require that terms have the same meaning for both parties, sender and receiver, and that they operate as a referent to the thing or concept being portrayed by a category. In other words, ideally, the content of a category ought to be unambiguously revealed to the message participants by its title. Class terms and common nouns (*e.g.*, man, horse, accounts payable) have two types of meaning: connotative and denotative. The *denotation* of a term is all of the specific objects, class members, or actual things to which the term applies and the class of these objects constitutes its extension. For example, "owners' equity" denotes all members of the class: capital stock, additional-paid-in-capital, and retained earnings. These members in turn constitute an extension of the term "owners' equity." The denotative capacity of a term relates to the principle of classification requiring that all categories should be exhaustive.

A term also has a *connotative* value. It captures and identifies that set of essential characteristics or attributes that hold for all the members of a class. These essential, defining characteristics are a term's intensional meaning. Because terms or titles have this trait, category labels can be expected to refer to the characteristics that are the basis for correspondence and differentia of member populations. It appears reasonable to ask that category titles employed in accounting be consistent with their class or population by expressing the distinguishing attributes of the class and exhaustively extend to all of its members.

A category label, despite its connotative and denotative meanings, should be explicitly defined. Definition of the designation given to a category ought to comply with rules of definition. These rules are outlined by Searles [1968, pp. 47–49]:

1. It should state the essential attributes or characteristics (correspondent and differentia) of the population that is to be classified in the category.
2. It should be exactly equivalent to the class of objects being defined: neither too broad nor too narrow.
3. It should not contain the name or label of the category being defined.
4. It should not be negative when it can be affirmative.
5. It should not be expressed in ambiguous, obscure, or figurative language.

ACCOUNTING CLASSIFICATION

Classification in accounting can be readily observed in: (a) data collection, (b) account posting, and (c) financial statement preparation. Classification and the use of categories takes place at other levels and in other accounting activities, but those just enumerated are particularly relevant to our discussion.

Data collection involves two concurrent aspects: observation of a unit to identify its distinguishing attribute for purposes of categorization, and, secondly, measurement of the magnitude of that attribute. It is useful in analysis to maintain a conceptual distinction between the two phases of attribute identification and attribute measurement that take place in accounting data collection. For example, a problem of measurement may exist even though a "correct" attribute has been identified, and, conversely, a measurement may be "correct" but the attribute identified is inappropriate. In both cases, the outcome is flawed; the explanation for the imperfect outcome, however, is quite different.

Summarization of data takes place and is eventually recorded in accounts, which are themselves categories. Accounts are then employed—as is, or upon further aggregation with other similar accounts—to construct financial statements. Financial statements can also be conceived as sets of categories with each statement containing its own compartments such as assets, owners' equity, operating expenses, *etc*. It is financial statement categories, and in particular the credit side of a balance sheet, that are the subject of what follows.

The categories of "owners' equity," "liabilities," and their sum, the balance sheet credit side—a category in itself—will be made subject to the principles of division (categories), nomenclature, and definition discussed earlier and evaluated accordingly. The law has been a significant influence in the evolution of accounting, especially for owners' equity. This analysis proceeds with an awareness of the role of law but also recognizes the desirability of evaluation according to precepts of theoretical propriety. Accounting theory and practice already reflect departures from strictly legal considerations, as, for example, in the case of consolidated financial statements, the recording of executory contracts such as capital leases, and the realization of revenue prior to or after the passage of title (precious metals; cash receipts basis). Nor would it seem a reasonable proposition that because of law, theoretical inquiry should either cease or remain within limits imposed on the accounting discipline by legal prescriptions.

THE BALANCE SHEET CREDIT SIDE

A balance sheet is demarcated into a debit side where assets and contra assets are classified, and a credit side where other real accounts are classified. The discriminate segregation of items into one side or another, and the dollar equality of the two sides, establish the idea that these are categories. As a category, the balance sheet credit side is subject to the principles of division, nomenclature, and definition. The credit side itself is divided into sub-categories which are also subject to the same principles. Furthermore, because measurement aggregations as well as attribute groupings are involved, it should be expected that the attributes are not only capable of being measured but that the measurements have some logical association with assets.

It is fairly common, in practice as well as in the literature, to observe the credit side of a balance sheet without a label identifying what this category is. "Liabilities and Owners' Equity" does not identify the credit side itself, only its two major sub-categories. The sub-category titles do not make it clear which is the correspondent attribute and which the differentia. Paton [1922, C. 2, 3, and 4] recognized these requirements and identified the credit side as "equities" (the correspondent attribute). He also called attention [p. 54n] to a practice of the day which was to denominate the entire credit side of a balance sheet as "liabilities." In the absence of consistent, widespread use of a category title, we could look to definitions or explanations of what the balance sheet credit side represents. However, a more efficient mode of analysis can be undertaken by drawing on some of the ideas developed earlier.

The two major sub-categories, liabilities and owners' equity, ought to be based upon a single characteristic or attribute which they share in common, because they are subordinate components of the principal category, the balance sheet credit side. That correspondent characteristic should be the *fundamentum divisionis* that is possessed by all members. In addition, the two major sub-categories should be demarcated by differentia—attributes exclusive to the populations of each. The connotative meaning of each category's title should indicate its differentia and correspondent characteristics and can serve as a point of departure. In short, by analyzing the sub-categories of liabilities and owners' equity and evaluating them with the standards for division, nomenclature, and definition, we can simultaneously draw conclusions regarding the balance sheet credit side category.

OWNERS' EQUITY

In the literature of accounting, owners' equity is usually described as being a representation of owner rights or claims. It is also viewed as a residual interest [FASB, 1976, par. 187; AICPA, 1970, par. 132], the "residual" being a result of regarding it as a difference between the categories "assets" and "liabilities." An "interest" is a legal share, a right or a claim. The balance sheet credit side has also been described [AAA, 1957, p. 7] as being made up of creditor equities (interests, claims) and shareholder equities (interests, residual claims) in the same way as Paton had described it [1922, p. 53]. We can explore the validity of "equity" as the attribute jointly possessed by all members classified in the balance sheet credit side, and owner versus creditor as designations of the attributes that serve to demarcate that side into its two major divisions.

Claims and rights are essentially equivalents, both being legal concepts. Black [1957, p. 313] describes a claim as being "legal capability to require a positive or negative act of another person." Kohler [1963, p. 86] defines "claim" as a demand under law. He also equates claim with equity, which in turn is defined by him as a right or claim to assets. If owners' equity is equivalent to the rights or claims of owners, then those rights should not only be subject to quantification but they should also be linked with assets both in amount and through logical association. These requirements would seem to be implied by the fact that a variety of individual "owners' equity" accounts are created and the magnitude of each is measured, throughout which accountants purposively and painstakingly maintain a balance between assets and "equities." As a case in point the rights of shareholders will be examined, although by the time this paper is finished, it will be apparent that the conclusions drawn extend to all legal forms of business ownership.

The rights of shareholders have been enumerated (see Figure 1) by Dewing [1953] and grouped accordingly as rights to management, rights to the corporate property, and rights to pass on changes in the original contract. Rights to pass on changes in the original contract (C), and to management (A) are neither reducible to quantitative values in any objective way, nor are they logically correlated with assets in a manner that would justify a proposition such as the basic accounting equation. For example, one would be hard-pressed to substantiate that "X" number of dollars in shareholders' equity is a measure of the right to demand financial statements, to elect directors, or to pass on changes in the bylaws or charter. Furthermore, as a

FIGURE 1

SHAREHOLDER RIGHTS

A. Rights to Management
  1. To elect directors. (Certain state statutes also vest in the shareholders the right to elect certain officers.)
  2. To inspect certain books—and in most jurisdictions, to demand financial statements.
  3. To approve or disapprove of certain extraordinary transactions, such as the sale or mortgage of important corporate property.
  4. To review, in general, the fiduciary action of directors by a plenary power of removal or action in equity for abuse of the discretionary power of the directors.

B. Rights to the Corporate Property
  1. To receive dividends when, as and if declared by the directors.
  2. To receive a proportionate share of the corporate property, when the corporation is wound up, or its property sold or exchanged.

C. Rights to Pass on Changes of the Original Contract
  1. To pass on changes in the purposes for which the corporation was organized.
  2. To pass on changes in the charter.
  3. To pass on changes in the bylaws.
  4. To subscribe to all subsequent issues of stock, subject to restrictions by state statutes or the provisions of corporate charter.

Source: Dewing [1953, p. 106].

practical matter, the value of most of these rights is questionable. Of the rights to management, all but the election of directors are seldom exercised, and the election of directors is of dubious significance. Voting is for a single slate of directors that is submitted by a nominating committee often dominated by the directors themselves, a number of whom may be members of executive management. The vote is either for or against, is seldom cumulative, and is frequently exercised by proxy. Changes in the original contract are uncommon. The scope of allowable corporate activities is ordinarily stated in broad terms to provide for change or expansion without shareholder consent. Many capital stock issues do not contain a preemptive right (C4), and even when present it often has been voluntarily surrendered.

Nor is shareholders' equity an expression and valuation of rights to corporate property (B). The right to dividends is not classified as shareholders' equity. Once a dividend is declared, it is a terminable obligation of the firm, and is classified as a liability. The right to share in liquidating proceeds from sale of the firm's assets after settlement of all liabilities, is contrary to an assumption of the going concern as expressed in the postulate of continuity [Moonitz, 1961, pp. 38–41]. It would be incongruous to report on a right which, it is assumed, will not be exercised. Even where exercise is the intention, valuation of such a right certainly would not be based on acquisition costs of assets, but rather on liquidation values. Obviously, no attempt is being made to measure this possibility in contemporary general-purpose financial statements.

An additional right absent from Dewing's list is the legal right of a shareholder to take his certificate and transfer it at his pleasure. This right is an abstraction which is perhaps reducible to valuation by reference to current market values for the shares, but market values are equal to book values only by sheer coincidence. It is doubtful in any case that the market price of shares would relate solely to this single right.

The idea that the shareholders' equity category and its associated valuation is a representation of shareholder rights has no substance. Rights are either abstractions that defy objective valuation, or are valued only by reference to amounts obtainable on liquidation, or in the market transfer of shares. The latter valuations are either contradictory to the basis of valuation for a going concern, or are irrelevant to accounting for the entity. Lastly, rights and claims are invoked by shareholders when they turn to the courts for redress. That is an occurrence that is neither in keeping with the usual, expected course of events, nor is it consonant with assumptions of enterprise continuity.

Equity has an additional connotation to that of rights or claims. It is also held by Black [1957, p. 634] to be "the amount or value of a property above the total liens or charges." It is a concept of wealth which is commonly used in conjunction with real property ownership [Boykin, 1975, p. 49], or life insurance policies [Levy, 1968, p. 180]. In both cases, reference is made to the current amount of resources that could be obtained upon liquidation of those assets. When applied to corporate shareholders, the concept of residual wealth can be interpreted in different ways. One might base such a measure on either the market value of outstanding shares or the liquidation value of net assets. Quite obviously, neither of the two possibilities is germane to the issue at hand since the former is irrelevant to measurements about the corporate accounting entity and the latter is a contradiction of the going concern assumption.

There is a third concept of the residual wealth of shareholders. In theory, if the net assets of an entity reflected the discounted present value of all future net cash flows, owners' equity would represent the shareholders' residual wealth. However, the historical cost model and current cost models are based upon entry price valuations of net assets. The discounted present value of future cash flows is an exit price basis of valuation. Conceptually the two are different, and consequently it would be theoretically incorrect to contend that an entry price valuation model will generally reflect shareholder residual wealth. Furthermore, the discounted present value of future cash flows from recorded net assets will not equal the same sort of measure of present value for the entire entity. And finally, it is generally conceded that a present value model of the firm is not yet capable of being implemented. It is apparent that shareholders' residual wealth is not portrayed in the traditional balance sheet. There are additional flaws in the received rationale attending owners' equity that have to do with it as a category within a system of categories. They will be discussed in the next section, where "liabilities" will be analyzed.

LIABILITIES

We are immediately confronted with a question: Is this category "creditor equities" or "owner liabilities?" The title is ambiguous; it does not clearly indicate the essential attributes of the population (correspondent *and* differentia), and it is not equivalent to the class of objects being classified, as we will soon see. Moonitz [1960] called attention to the disparity between a legal definition of liability and what was implied by accounting practice. Although he did not suggest that the category label be changed, it is apparent that the meaning he attached to the title is not confined by law but instead is an economic concept concerned with commitments ("obligations") to future resource outflows.

The meaning of liability in the law is either very broad and general, or quite specific, being tantamount to debt. The former interpretation—an obligation to do, pay, or make something good—goes beyond the boundaries of accounting and economic affairs. The notion of debt, in turn, is too restrictive to explain the variety of balances that are classified as liabilities but are not unconditional promises to pay a fixed or determinable sum at a specified time, including interest. Persistent efforts to describe this category as liabilities, which is basically a legal concept, have led to conflicts in the past that were very difficult to resolve and which raised questions about the "fruitfulness" of such a category. For example, the recording of executory contracts such as capital leases and unfunded pension cost liabilities was resisted on the ground that they were not liabilities or "legal debt." But they were commitments taken on by the firm that would call for resources in the future, and that, in the final analysis, was a more important and relevant consideration than legal status. Rather than holding out this category as a representation of liabilities, can it be held to be creditor equities? If so, it would corroborate the proposition that the credit side of a balance sheet represents claims or rights.

It is difficult to conceive of creditors having any claims or rights with respect to the debtor firm other than those afforded by the courts. Legal rights are those which give the creditor an ability to demand that the terms of a contract be fulfilled, or to receive indemnification for damages suffered because of non-performance. However, in the usual course of events, especially when operating under the assumption of a going-concern, a firm will virtually always discharge its obligations without creditors having to invoke their legal rights. It would seem reasonable to believe that financial statements purport to communicate something more than that which is highly unlikely to occur.

In addition, the notion of rights or claims has returned us full-circle to a legal basis for classification essentially equivalent to "liability." We have already pointed out that financial statements customarily include accounts such as capital lease contracts payable and unfunded pension costs payable, which are not rights, claims, or legal liabilities. The same is true of estimated warranty costs, deferred profit on certain installment sales, and deferred investment tax credits, among others. A principle of logic stipulated by Werkmeister [1968, p. 168] states that, "what is true universally, *i.e., what is true of each and every member of a given class, is true of any given member of that class.*" This condition is also cited as a necessary property of a rational classification system by an American Accounting Association committee [1977, p. 77]. It is illogical to contend that all species in a category, such as claims, are claims, when in fact some are not. It is not only the category label that is deficient—be it liabilities, claims, rights, or equities—the category itself fails the criterion of being exhaustive.

The category also suffers from another shortcoming. Lazarsfeld and Barton [1951, p. 157] explain that, "In an articulated set of categories those on each step must be exhaustive and mutually exclusive." Because owners' equity and liabilities are coordinate categories, this requirement pertains to both with equal force. A cursory examination of balance sheets is sufficient to reveal items, seemingly adrift in a "no-man's land" between liabilities and owners' equity, such as Minority Interest, Deferred Income Taxes, and Deferred Investment-Tax Credits. Is the Excess of Unallocated Book Value Over Cost arising out of a bargain purchase business combination a liability or an element of owners' equity? Although accountants are disposed to claim that they are concerned more with economic substance than legal form, it is likely that a bond in perpetuity would be classified as a liability. By the same token, convertible debentures with underlying shares whose market price has risen well beyond their conversion price threshold would remain in the liabilities category along with other terminable obligations, and preferred shares with a mandatory retirement provision would be excluded because they are legally members of the "ownership equity" group. Distinctions such as these do not rest on substantive differences but rather on legal technicalities which inordinately stretch the boundaries of common sense. In large measure, this shortcoming is a fault of a classification system based on equities and liabilities, categories which are not exhaustive and not mutually exclusive.

A Recounting

From the preceding analysis of the balance sheet credit side and its major sub-divisions, the following conclusions can be drawn:

1. The attributes presumed to characterize the categories in question are legal qualities. It is very questionable that in the course of observing transactions an analysis is made of whether a change has occurred in the asserted legal rights of shareholders: rights to manage; rights to

pass on changes in the original contract, or; rights to corporate property upon liquidation. It is dubious that accounts, or the categories of which they are a part, could portray qualities such as these.

2. Legal qualities (attributes) are abstractions that do not lend themselves to measurement in dollar terms.
3. There are members being classified that cannot be explained as possessing the attribute of "equity of creditors" (*e.g.*, warranty cost, certain executory contracts). Therefore, the category being identified by the title is not exhaustive, and the title itself fails in denotating class members.
4. The categories of liabilities and owners' equity are neither exhaustive nor mutually exclusive. Balance sheets are readily observable which contain credit side members that are not in either category (*e.g.*, deferred credits, minority interest) or that are factitiously classified (*e.g.*, preferred stock with mandatory retirement provision, convertible bonds with prices that make conversion almost inevitable).
5. A representation of equities would be irrelevant to the accounting entity as a going concern since legal claims and rights are not resorted to under normal circumstances. Furthermore, even if that were what was being presented, the basis of valuation would logically be some form of liquidation price, not entry prices.

Principally because of these reasons, it is concluded that owners' equity and liabilities (and equities in total) are not valid bases of classification. An alternative basis will now be proposed.

A DIFFERENT CLASSIFICATION BASIS

Several writers [Marple, 1962, pp. 57–60; Goldberg, 1965, p. 171] have posited that a balance sheet can be viewed as a reflection of economic resources or capital (intangible as well as tangible) and the sources of capital. The balance sheet is not only a financial statement but a category as well. It is a category whose correspondent characteristic is resources, with subdivisions that reflect the composition (debit side) and sources of capital (credit side). Paton [1922, pp. 44, 76] referred to equities as "sources of funds" and "investments." Only assets that accountants are able to record are comprehended by the term "economic resources." The entry process that takes place when assets are initially acquired identifies the asset and its source. Subsequent events and decisions may bring about substitutions and shifts in both the composition of assets as well the sources of capital, but the basic nature of neither is thereby altered.

It is understood, therefore, that the sources of capital presented on a balance sheet are not necessarily the original providers of capital to the firm. Capital obtained originally from customers or creditors for example, may be committed for conveyance to the government or employees. Although the latter parties did not supply the capital originally, we may attribute to their willingness to forego immediate collection, credit for the firm holding more in assets than would otherwise be the case. There is no intention to purport that all of the various sources are either original suppliers or original creators of capital. The entity has assets (capital) because sources have furnished them directly, or suspended temporarily their prerogative to withdraw them. Nor is it intended to suggest that the *specific* assets presented on a balance sheet came from any particular source, or even from these reported sources for that matter. For example, a specific asset may have been secured with proceeds from sale of another asset.

"Sources of capital" is a classification basis for the credit side of a balance sheet that is rational, consistent, exhaustive, and which clearly identifies the common characteristic shared by all included accounts. Furthermore, it is linked with assets (capital) both in amount and through logical association. Note, also, that this basis of classification relates directly to the entity unlike "owners' equity" which incongruously attempts to make a representation about another, outside entity (shareholders). How it may be divided into mutually exclusive categories will be demonstrated shortly.

Many accounts are evident and self-explanatory sources of capital. This is apparent in the case of trade credit, notes, bonds, mortgages, lease contracts, customer deposits, donations, capital stock, and retained earnings. Others are not and therefore call for some further explanation. At first glance dividends payable may not appear to be a source of capital because they are born out of a declaration by the Board of Directors. If we rephrase the wording of the account to "profits awaiting distribution to shareholders," the source of capital becomes clearly evident. Estimated product warranty costs arise when product sales are recorded and it is recognized that there will be a future use of resources to carry out repair services. In setting product price, a factor is taken into consideration to provide for repair services so that revenues are, in part, resources obtained in advance from customers for fulfillment of warranty contracts. Therefore, the presence of a warranty sold in conjunction with a product results in capital being obtained by the firm. Similarly, because income taxes are passed on to customers, taxes payable can also be identified with that source.

Accrued liabilities and employee withholdings have been labeled by Hunt *et al.* [1971, pp. 203–8] as "spontaneous," or "self-generating" sources of credit. These liabilities would call for immediate payment were it not for institutionalized procedures established for the sake of economical collection and payment of obligations. In theory, payment of taxes, salaries, interest, and fees could be required daily instead of at longer intervals. The expense and effort necessary to accomplish this kind of arrangement would be inordinate. Consequently, the designated recipients of these resources, by leaving them with the firm pending payment are, in essence, sources of capital. The reasoning underlying a liability for an adverse legal judgment is correspondingly based upon the court's deference in collecting the decreed amount.

How all accounts on the credit side of a balance sheet are alike has been explained. This category can now be defined.

> *Sources of Capital*: A designation accorded the credit side of a balance sheet. It is a category that portrays the entity's acquisition of capital in past transactions which is now invested or held in various asset forms, and the magnitude thereof.

We may now inquire into how some accounts are different from others in order to move on to a new set of mutually exclusive categories.

A New Division

Of the several characteristics that are possessed by different sources of capital, the one which seems to be of paramount interest to financial statement users is whether or not, as the firm now views it, they will be settled by conveying assets. The conveyance of assets is a critical event. Ordinarily, it will be accomplished in the form of cash, and so provision must be made for an appropriate alteration in the composition of assets. Then assets have to be obtained to replace those liquidated and disbursed, or a contraction of operating levels must take place. This theme is keynoted in the FASB *Statement of Concepts* on objectives of financial reporting [1978, par. 37]. The extent to which sources of capital are transitory or not is relevant to many users of financial information. Some sources are transitory while others are not, in the sense that an entity has recognized and made commitments[1] to a future outflow of resources as a consequence of past events or transactions.

Fundamentally, in reporting liabilities an entity is recognizing that a critical, interrelated series of asset transformations, cash flows, and refinancing-reinvestment activities will have to take place which requires careful balancing and timing. At the heart of these cyclical phases in a corporation's life are asset flows. Conversely, some sources of capital do not impose the same sort of exigencies. They are standing sources of capital devoted to an investment in resources which are not now committed to a future outflow. It is cognizance of the permanence, or lack of permanence of sources of capital which can serve as the basis for demarcating a balance sheet credit side into two mutually exclusive categories. These categories will be referred to hereafter as "Transitory Sources of Capital" (TSC) and "Standing Sources of Capital" (SSC). The basic accounting equation thus becomes:

(Assets) $A = SC$, and $SC = TSC + SSC$

TRANSITORY SOURCES OF CAPITAL

Those items which are customarily classified as liabilities are for the most part terminable obligations, and therefore should be classified as Transitory Sources of Capital. Liabilities which are unconditional promises to pay or deliver a sum certain are included as are obligations of estimated amount even when the other party is not specifically known. A necessary proviso is that all obligations are from past transactions [Cf. Moonitz, 1960]. In addition to liabilities, other accounts representing a source of capital which is transitory would be classified in this category. An issue of preferred shares that will be retired either because of a mandatory provision in the contract, or because the firm intends to exercise an optional call provision, is an example of such an item. Other items which are now conventionally reported as liabilities—often because it is difficult to reason that they are components of "owners' equity"—would be classified in the Standing Sources of Capital category. We can now explicitly define the basis of this category as follows:

> *Transitory Sources of Capital*: A designation accorded one of the two coordinate divisions of the category, Sources of Capital. It represents an entity's commitment, and the magnitude thereof, to satisfy future demands on resources that are certain, or highly likely to occur (subject to close estimation) resulting from past transactions.

STANDING SOURCES OF CAPITAL

In contrast to those sources that are transitory, the remaining items are characterized as being uncommitted to meet future demands on resources coming from outside the firm. They consist of an assortment of items which represent standing sources of capital invested in recorded assets, whether or not they are owner sources. Standing Sources of Capital does not mean that there is a permanent and inviolable source of capital which will never be encroached upon. It can be diminished by reason of future losses, distributions of future dividends in excess of profits, or other disinvestments. However, it is not now earmarked as a source which will result in an outflow of resources and as such is intrinsically different from Transitory Sources of Capital. Numbered among the constituents of the Standing Sources of Capital group are: contributions by majority and minority shareholders, except for those cases where repayment is anticipated; donations; warrants capitalized as outstanding or because they expired; retained earnings; convertible bonds when conversion is anticipated and probable; the excess of unallocated book value over cost; bonds in perpetuity; and holding gains or losses.[2]

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[1] The Committee on External Reporting [AAA, 1969, p. 98] took the position that a balance sheet is a source of information on "stocks of resources" and "resource commitments."

Treasury shares carried as a contra to the shareholders' capital account can be interpreted as an amount of capital returned to a particular source. A more consistent application of the sources of capital concept would be to treat the shares as if they had been formally retired by an appropriate reduction of accounts. By the same token, a deficit should be reported as a reduction of the total sources of capital to indicate the extent to which resources obtained by the entity have been depleted due to unprofitable activities.

A technical problem arises out of the convention of capitalizing retained earnings when stock dividends and certain split-ups (which are essentially stock dividends) are effected. In these cases, an amount is deducted from retained earnings and added to the capital stock, and possibly to the additional-paid-in-capital accounts. This aberrant transfer distorts the valuation of each of the respective source-of-capital accounts. Presenting each of the paid-in capital accounts as being comprised of two elements, that actually paid in and that transferred in, would allow us to preserve the integrity of source valuations. In conclusion, a definition can be stated as follows:

> *Standing Sources of Capital*: A designation accorded the second of two coordinate divisions of the category, Sources of Capital. It represents the source and magnitude of capital arising out of past transactions that is presently uncommitted to the settlement of obligations and, therefore, is devoted to a standing investment in assets.

CONCLUSION

The existing basis of classification for the credit side of a balance sheet and for its sub-categories is deficient. It is not exhaustive nor are the articulating categories mutually exclusive. Owners' equity is incapable of being satisfactorily explained, and its measurement is an enigma. The rationale offered to explain what this category represents is contradictory, internally inconsistent with other aspects of accounting theory, and invalid. An entirely new basis of categorization is needed that is founded on principles of classification and which is consonant with a coherent accounting theory for modern-day entities. The one which is developed here is rooted in a pervasive characteristic possessed by all credit-balance items on the credit side of a balance sheet—they represent sources of capital invested in recorded assets of an entity. An important distinction between these various sources of capital provides the basis for their demarcation into Standing Sources and Transitory Sources of Capital.

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[2] The author takes no position in this paper on the question of whether holding gains are determinants of income. It is simply recognized that some accounting models consider them to be capital adjustments, and provision has to be made for such an account.

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REVIEW ARTICLE

Canning's *The Economics of Accountancy*—After 50 Years

R. J. Chambers

A COLLEAGUE, on hearing that I was to review Canning's work "fifty years later," inquired: How does one do justice to work done in the circumstances and the state of the art so long ago? None of the answers I can frame is entirely satisfactory. One may be aware of the antecedent literature and to some extent of practice at that time. But there is the risk that linguistic habits may have changed, the risk that the opinions of others on the work may cloud one's judgment, and the risk of interpreting the work in the light of events and debates subsequent to its publication. To be aware of these possibilities is at least of some help. So also is the distance in time; for one can be rather more objective and dispassionate about matters in which one was not personally and actively engaged.

Some of the pitfalls may be avoided by considering the systematic quality of the work. As Canning's book is the result of a "comprehensive study of accounting theory and practice," even though from the viewpoint of "the professional student of economics" (p. iii), I shall be concerned with its systematic quality. As Canning found it necessary to invent or borrow terms not commonly used in the literature, I shall need to quote his own words frequently, in the hope of avoiding misinterpretation.

Even then there are difficulties. First, Canning was anxious that economists should be more fully aware of what accountants were doing, since many of them made use of what accountants produce. Though he was critical of the literature and practice of accounting in many respects, in others he seemed to be more generous and tolerant than the evidence warranted. Second, though one would like to take the work as an exposition of accounting theory and practice with clearly distinguished ameliorative suggestions, it is not always easy to distinguish Canning's interpretation of "the professional accountant's" ideas from his own ideas. It is rather like trying to reconstruct a knight's move given only its present position on a chess board.

Canning's work was one of the earliest analytical studies of accounting that came to my notice when, 15 years after its

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This review article was solicited by the Book Review Editor upon the reissuance of John B. Canning's *The Economics of Accountancy* by Arno Press Inc., in 1978. Canning's book was originally published in 1929 by The Ronald Press Company, New York. All references in this article to page numbers alone are to Canning. The pagination in both the original publication and the republication are the same.

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publication, I became seriously interested in what stood as the theory of the subject. It delighted me, perhaps because his observations tallied with many of my own. He pointed out the "great lack of uniformity" (p. 5) in practice. The dicta of early writers "were amazingly positive and their argument as amazingly inconsequential" (p. 8). Writers and practitioners proceeded by "a sort of patchwork and tinkering . . . there was little going back to fundamentals for a fresh start" (p. 9): Instead of one general rule for inventory valuation "there is in reality a myriad of diverse rules" (p. 10). Definitions of asset were "confusingly diverse" (p. 13). "The accountants have no complete philosophical system of thought about income" (p. 160); " . . . diverse valuations of diverse things are added to find an asset total that, dollar for dollar, cannot possibly have a common significance" (p. 319).

These critical observations were enough to indicate the potential fruitfulness of a comprehensive study of theory and practice; enough to suggest to anyone whose mind is not closed against the analysis and criticism of his art, a whole series of matters deserving re-examination and reconstruction. Yet, 50 years later, many of these observations may still be made of accounting theory and practice. Indeed, in that interval, there has been such a proliferation of alternative rules, definitions and practices, that the diversity of which Canning complained has become greater rather than less; and much of the debate that rages consists of argument which, to one party or the other, is still "amazingly inconsequential."

Canning was, by training and for much of his life, a statistician and economist. His close attention to accounting appears to have spanned the decade of the 1920s, during which he was in charge of the division of accounting in the Department of Economics of Stanford University. *The Economics of Accountancy* was published in his forty-fifth year. Not only did he bring to bear a point of view and a background different from those of accountants; he also brought his own brand of mild but nonetheless acute impatience with vagueness and indecisiveness, and his own often-pungent diction to clothe it in. If the outcome was not itself free of solecisms, the reason lies almost assuredly in the fact that there were few, if any, others of like competence and interests; few, if any, who were able and willing to venture into the common but uncharted borderland of economics and accountancy.

Two Disciplinary Ideas

Two features of *The Economics of Accountancy* deserve special notice, for they have a general bearing on theory and practice. The first is the attempt to define rigorously the terms used in exposition and argument. All valid argument depends on specified definitions. Vague or loose definition leads to inconclusion. Canning attempted valiantly to make good some of the omissions and to reduce some of the laxity he found. With what success I shall presently consider. The second is the specification of the rules relating to the "merging by summation or otherwise" of "individual measures."

Accounting is necessarily aggregative. Canning found that its literature and practice abounded with examples of different competing formulas or techniques of valuing. Little attention had been given to the effects of this on the meaning of financial statements; and almost nothing had been done "to discover to what extent a common, general method might be expected to enhance the usefulness of the principal statements" (p. 206). This condition needed rectifying.

The propositions which Canning set down are the ordinary rules for aggregative measurement. But they were new to the accounting literature. Though they appeared in a chapter on asset valuation, they are equally applicable to income calculation or measurement. Briefly, in Canning's language, they are:

1. "[T]he individual things measured should belong to a common population . . . [,] all . . . sensibly alike with respect to the property . . . under investigation."
2. "[T]he unit of measure must have a sensibly common significance throughout the measuring."
3. "[T]he unit of measure must either be uniform in magnitude throughout the measuring, or all units employed must be convertible into the unit in terms of which the measures are merged."
4. "[T]he method and circumstances of measuring should be as nearly as possible common to all measures."
5. "[T]he degree of error . . . should not significantly vary as between one variate and another" (pp. 199–200).

Many have quoted from Canning, but it has amazed me for years that this section has escaped notice. If individual measures are to be merged, it is useless from the outset to define or make individual measures which are "sensibly unlike." Understanding and acceptance of the rules would impose an unavoidable limitation on the invention or adoption of "individual measures" of unlike properties where the individual measures are to be aggregated or related. But, as we shall see, Canning himself at a number of points overlooked this limitation.

Assets, Liabilities and Proprietorship

The analysis begins with the "fundamental equation of accounts," discussing, in turn, assets, liabilities and proprietorship, net income, and financial position. In the chapters on income, Canning makes clear his debt to Professor Irving Fisher. But the influence of Fisher is apparent at a much earlier stage.

The "professional accountant's implied definition" of *asset* was said to be "any future service in money or any future service convertible into money . . . the beneficial interest in which is legally or equitably secured to some person or set of persons" (p. 22). *Proprietorship* is "the entire beneficial interest of a holder of a set of assets in those assets" (p. 55). Thus, in the case of a company, proprietorship is the interest of the company in its assets, not the interest of any other party. The value (or amount) of assets is identical with the amount of gross proprietorship (p. 48). A *liability* is "a service, valuable in money, which a proprietor is under an existing legal (or equitable) duty to render to a second person . . ." (pp. 55–56). *Net proprietorship* "cannot be qualitatively defined"; it is the difference between the sum of the liabilities and the amount of the proprietorship (p. 56).

This set of definitions is oriented to the future. It may be granted that the amount or value of an asset at a stated date is serviceable information only if it is in some way pertinent to the future. But it does not follow that that value shall be obtained by reference to future services. Fisher [1906, p. 52] had described income as a flow of services through a period of time; and one of his definitions of the "capital value" of an item of wealth was "the present worth of the future income from the specified capital" [Fisher, 1906, p. 202]. (I shall call this net present value or NPV.) Canning appears to have supposed that a flow of future services could not be obtained unless a stock of such services was already in existence at some prior date. We may agree with him that services (products, or generally income), not agents (items of wealth), are wanted (p. 235). But "to want" is not to have or to hold at a specified date. The services of any durable good cannot be acquired "in infinitesimal increments continuously supplied" (p. 235). But it is nothing more than a figure of speech to assert that those services "must be acquired in stocks." The holder of a machine does not hold a stock of machine-hours of service. He holds a machine which will not deliver its service except over a long period; and not at all without a power supply and material and labor inputs. Fisher seems to have been much closer to the mark in describing assets, or the property-right in assets, as "the right to the chance of obtaining some or all of the future services" of those assets [Fisher, 1906, p. 22].

As for the value of the assets of a proprietor, Canning affirms that "[t]here is no rational mode of dividing all future money receipts among the component services" of which those receipts are the resultant (p. 237). There is thus no way of finding the "future services in money" of identified assets. Since accountants did assign money amounts to identified assets (objects, or items of wealth), and seldom if ever (in Canning's time) on the basis of their present values, it cannot be properly held that Canning's definition of asset is implied by accountants' practices. I return to the matter later.

Income

Canning's search of the literature disclosed "an astonishing lack of discussion of the nature of income" (p. 93). "The accountants have no complete philosophical system of thought about income; nor is there evidence that they have ever greatly felt the need for one. Their generalizations . . . are too inchoate . . . to permit one to suppose that they have ever seriously put their minds to the philosophical task" (p. 160). That being the case, it might be expected that the income calculation practices of accountants would come under rather severe censure; for without systematic thought there would be little prospect of systematic practice. Canning noticed some oddities. But his general view on the measurement of income by accountants was almost laudatory. "The accountants can properly be said to adhere to one highly unified and intricately articulated theory"! (p. 143). If that were the case, the content, structure, and purport of the theory could have been readily described, for a unified and articulated theory is far simpler to describe than a partial theory with qualifications and subsidiary *ad hoc* propositions. But the task was not simple.

The discussion of income, Canning found, was limited to the measuring of the income of "a particular time-period that is *past*" (p. 94). The emphasis (in the original) seems to suggest that there is something amiss in calculating a past income. Canning's exposition begins with the notion of ultimate total income, which "qualitatively fit[s] that which the accountant will ultimately have treated as income" (p. 94). Ultimate total income is the "final fruition in money" of enterprise assets and other services. At the termination of a venture, all the facts are in; the final fruition is certain.

Periodical income has no such certainty; but the task of computing it must be faced. By *gross operating income* accountants mean "the fruition in money (or the equivalent of money), effected within the period, of all those elementary services which are the components of enterprise operations" (p. 101). *Gross financial income* is the "hire earnings" arising from loans. *Gross income* is the sum of these amounts. *Net income* cannot be described qualitatively; "[i]t is a wholly quantitative thing" (p. 126). It is equal to gross income less deductions, an expression that "comes perilously near being meaningless" (p. 127).

There is indeed a "qualitative difference" between gross income and the deductions. Gross income represents only "favorable aspects of events" in a period; but it does not represent *all* favorable aspects. Except in the case of ventures which value inventories on a selling price basis, no effect is given to the "increase in the spread between cost and selling prices" (p. 134). Fixed assets may increase in value, but no account is taken of the increase. On the other hand, unfavorable aspects of events are recorded "as soon as their likelihood is foreseen." Neither the favorable nor the unfavorable aspects are therefore measures of contemporary events of a specific period. An approximation to the "ideal statistical treatment of income" would be obtained if net income were taken as the algebraic sum of receipts and disbursements, appreciations and depreciations in "true capital value," and increases and decreases in the book value of assets that cannot have a true capital value (p. 135). The meaning of "true capital value" emerges in Chapter VIII.

That chapter, on the measurement of income, presents "a comparison and contrast of the accountant's theory with *an* economist's" (emphasis added). Economists, said Canning, have put forward many different theories. He did not attempt to analyze them; rather he chose Fisher as the economist whose work on the subject was "the most exhaustive," and whose book, *The Nature of Capital and Income*, in Canning's opinion, had many parallels with the ideas and the language of accountants. For one reason or another, views similar to those of Fisher have repeatedly been described since Canning's time as *the* economist's notion of income. This is not the place for demonstration of the fact that economists generally did not or do not concur with Fisher's concept. It is worth noting that Canning did not represent Fisher's views as views of economists generally, or *the* economist's view. But the influence of Fisher is marked.

To demonstrate that influence, we must consider the essence of Fisher's exposition as Canning portrays it. Wealth consists of material appropriated objects, and property of rights in those objects. Services are the benefits of wealth. Prices are ratios of exchange between quantities of wealth, property, or services; and value is the price of material objects multiplied by the quantity. In general parlance, and in the usage of economists as far back as Adam Smith, and including Fisher (see Fisher [1906, p. 11]), the price referred to is a selling price. In a passage not cited by Canning, Fisher used "capital-value" of the stock "of existing instruments of wealth . . . when all articles are measured in a common unit" [Fisher, 1906, pp. 66–67]. (I shall call this discovered or "observed capital value" (OCV) to distinguish it from computed capital value, NPV.) Fisher noted that the businessman ordinarily uses "capital" in this sense of capital value, a usage he adopted. The "capital account" (which in ordinary usage would be described as a balance sheet) is "a statement of the amount and value of the property of a specific owner at any instant of time" [Fisher, 1906, p. 67].

To return to Canning's summary—there is one primary measure of income and of outgo called "realized income." The time-schedule of the money valuations of "successive desirable events proceeding from a wealth source" constitutes a measure of gross realized income. If against this time-schedule there is set off a time-schedule of the money valuations of "disservices," net realized income is obtained. The time-schedules referred to may cover periods of any length "not in excess of the duration of the wealth source." At any point of time, most if not all of the components of the time-schedules will be future items. The use of "realized" is thus vastly different from the usage of the term by accountants. To avoid confusion it would have been better to use some other term than one that generally denotes a past event.

There are two "derivatives" of realized income: "capitalized income" (or capital value) and "earned income" (or earnings). The capital value referred to here is obviously the computed capital value of Fisher. If the components of the time-schedule of net realized income are discounted to a given date and aggregated, the sum is "at once the capital value of the item of wealth and the capital value of the income from it" (p. 155). The difference between the capital values at the beginning and the end of a period is the realized net income of the period. If to the realized net income of a period is added the change in the "capital value" of an item of wealth in a period, the earned income or earnings of the period is obtained. "In other words, net receipts plus appreciation or minus depreciation, is the measure of earnings from a given source during a period" (p. 155).

This is confusing. Let $NPV_1(A)$ be the capital value of an asset, and $NPV_1(I)$ the capital value of the expected income from it at t_1. Then, from the third sentence of the previous paragraph, $NPV_1(A) = NPV_1(I)$. Let RY_2 be the realized net income of the period ended t_2. Then

$$NPV_2(A) - NPV_1(A) = NPV_2(I) - NPV_1(I) = RY_2$$

Let E_2 be the earnings of the period; then, by the definition of earnings above,

$$E_2 = RY_2 + [NPV_2(A) - NPV_1(A)]$$

which is clearly a case of double-counting. The fallacy arises, it seems, from Fisher's use of "capital value" in two different senses, as capitalized income and as the product of selling price and quantity. I have elsewhere noted the confusion to which this gives rise [Chambers, 1971]. Apparently Canning missed the two different usages.

The solecism can be avoided by giving to "capital value" a different meaning in the derivation of earnings than is given to the resultant of the discounting calculation. Let $OCV_1(A)$, $OCV_2(A)$ represent the selling prices (observed capital values) of the item of wealth at t_1 and t_2; we may then write an expression for earnings which does not have the defect of the previous expression:

$$E_2 = RY_2 + [OCV_2(A) - OCV_1(A)]$$

But there is still room for terminological confusion. Canning said, "in other words," earnings equals net receipts plus appreciation or minus depreciation. The ordinary meaning of net receipts of a period is not the same as realized net income, RY_2. If net receipts were given its usual meaning (ascertained cash inflows less outflows, or more generally, operational inflows less outflows of monetary items), and the selling prices of assets were ascertained, the amount of earnings would be determined objectively, without recourse to the speculative exercises necessary for the calculation of capital value in the capitalized income sense. Canning's description of earnings as net receipts plus appreciation or minus depreciation, in fact, came closer to accounting practices of the time than the form of calculation from net present values; for the practice of recording appreciation had not then come under proscription (see pp. 76, 161*n*). There was certainly little evidence, if any, in the mainstream of the literature and practice of accounting, of support for the mode of calculation he had described just previously to his sentence "in other words."

But is the calculation of income or earnings by reference to net present values superior to a calculation based on the experienced past? In one sense the question is pointless; the two things are qualitatively different. That apart, the feasibility of calculating periodic income or earnings in the manner suggested by Canning is open to serious doubt. As I have noted, one of the rules of aggregative measurement is that the measuring must be done under common circumstances. The same applies of course to "subtractive" measurement. The NPV calculations at the beginning and end of a period cannot be said to be made under common circumstances. The external conditions which affect expectations of future revenues or incomes will have changed; there is no way of being assured that the calculations yield magnitudes which are qualitatively alike. Further, the approximation to the "ideal statistical treatment of income" mentioned above entails the aggregation of three qualitatively different kinds of amounts—receipts and disbursements which are factual, changes in "true capital value" which are expectational, and changes in book values which are neither factual nor expectational. The aggregate must therefore come under the same interdiction as Canning applied to the accountant's practices—"dollar for dollar" the separate components and their aggregate cannot have a common significance!

Financial Position

Canning found that "financial position" was not defined in the literature, notwithstanding that "the determination of financial position" was "the accountant's chief objective" (p. 179). He sought to give the term a meaning and to show "how and to what degree the major end-product of accounting, the balance sheet, does reflect or disclose an existing financial position" (p. 179).

Financial position seemed to him to refer to the status of an enterprise with respect to procurement and distribution of funds (p. 180). Now, certainly, business enterprises in the course of business engage in the procurement and distribution of funds. But a financial position is not descriptive of such processes. It may be the resultant of those processes in the past, and the point of departure for further like processes in the future; however, neither a resultant nor a point of departure is a process. Having associated balance sheet with financial position, it is odd that Canning did not begin the examination of financial position by way of an extension of the previous discussion of assets, liabilities, and proprietorship. But just as nature proverbially abhors a vacuum, so apparently did Canning abhor the idea of a dated state or position. Almost everything is described as process, or flux.

If financial position must be a position with respect both to fund procurements and fund distributions, should it represent what *has occurred* up to a balance date, or procurements and distributions that *are expected to occur*? The difficulty of opting for what has occurred is that it would entail presenting total receipts and payments since the founding of the enterprise; and obviously the balance sheets made up by accountants did not show that. Canning therefore chose the alternative:

> Financial position as disclosed in the balance sheet means [with respect to procurement of funds] "regarded from this date, future fund procurements by means of enterprise opera-

> tions will occur to the extent of the directly valued assets. Toward the procurement of further future funds there are certain correctly, but indirectly, valued assets; future necessary services now subject to control, in the amounts set out." In general, financial position is a position with respect to asset valuation and constitution rather than with respect to capital value of the enterprise (p. 191).

Now, to consider financial position or a balance sheet as representing "procurements and disbursements expected to occur" is less tolerable than the option rejected. For if all movements of funds are to be embraced by a statement of financial position, it is at least feasible to do that for the finite and known past of an enterprise; it is impossible to do the same for the unknown and potentially open-ended future. The dilemma was of Canning's own making. If he had not referred to procurements and distributions, and had alluded to, say, funds available at a stated date and the respective interests of the creditors and the enterprise in those funds, the upshot may have been much closer to what, in other contexts, would be understood by position.

Indeed, to assert that financial position is "a position with respect to asset valuation and constitution" is to state only part of what a balance sheet represents. From time to time companies find themselves in "financially difficult positions." This phrase, or any phrase like it, can have no meaning with reference only to asset valuation and constitution. A difficult or unsatisfactory financial position occurs when a company is, or appears to be, unable to meet its debts and ongoing outlays out of its assets. Position might reasonably be held, therefore, to have some connection with the relationship of assets to debt. When discussing liabilities, Canning made passing reference to the ratio of current assets to current liabilities (p. 67). But apparently he did not regard this (and other such balance sheet ratios) as indicative of aspects of financial position. Had he done so, he may have arrived at a quite different definition of financial position—and a quite different view of asset valuation. For it is certain that no enterprise can meet its debts as they fall due out of the calculated present values of its assets. Amounts presently owing and the capitalized value of income prospects are not "sensibly alike" with respect to a common property.

Asset Valuation

The discussion of valuation occupies four chapters and almost one-third of the work. Whether accountants subscribe to any theory of value is not known, said Canning. But they do practice valuation (p. 198). There are two valuation procedures—direct and indirect valuation.

Direct valuation is possible only when "a realized money income exists and is statistically determinable" (p. 207). Realized money income is here used of calculated present value, which entails setting off the series of expected money outflows against the series of expected money inflows and discounting the net inflows to a present date. "Any direct and separate or separable conversion into money in a future time . . . gives rise to a realized income" (p. 207). Cash and receipts and payables may be directly valued since they are indicative of "separate conversions into money," at a present or future time. The nominal amount of receivables should be properly adjusted (*i.e.*, discounted) with respect to time. Payables are not mentioned, for Canning was dealing with assets; presumably they, too, should be discounted.

A direct valuation may also be made of finished goods inventories. But here Canning wavered. He proposed a "carrying value" which, after allowing for "standard" charges for loss on bad debts and selling and general expenses and a "normal" profit (based on "some normal industrial rate of return"), would enable a normal profit to be earned (pp. 222–223). No mention was made of discounting. The amount entered in the balance sheet would be the carrying value; a footnote would show the inventory at "market." The process of calculation is markedly different from other direct valuations; the use of "standard" charges and "normal" rates of return makes the result subject to errors not inherent in the valuations of cash and receivables. The use of carrying value together with other direct valuations thus violates rules 1, 4 and 5 of the rules for aggregative measurement.

All assets other than those already mentioned must be "indirectly" valued. I have already noted Canning's acknowledgment (p. 237) of the impossibility of finding a "true capital value" for assets used jointly with other assets or services. But what the accountant can do is "estimate valuation differences." However, if absolute capital values cannot be determined "how can differences be found"? The differences are not capital value differences but opportunity differences (p. 237).

> Each item represents the difference to the concern between having a particular stock of services of a particular kind *without future outlay for it* and being wholly without such services in the buying-holding-operating-selling position of the enterprise at the time of valuation (p. 241; emphasis in original).

This does not imply valuation at cost of replacement less depreciation in the sense of replacement of capital goods with others of like kind and quality; Canning cites "accountants' reluctance" to follow that rule (p. 245). The quoted dictum relates to the cost of replacing "stocks of services" (p. 243). The "actual cost of the unused portion of a stock of services is nearly always a more appropriate value than any other" (p. 244).

This introduces a bracket of difficulties. In the first place, the use of "valuation" qualified by "direct" and "indirect" implies that the valuations are the same in kind. Obviously a capitalized value of the net proceeds of an asset is *not* the same as a proportionate part of its cost; and calling the two amounts "valuations" cannot make them "sensibly alike." Second, it is impossible to reconcile valuations as "opportunity differences" with the definition of financial position. Does the amount assigned to any such asset represent "fund procurements" that are expected to occur? Certainly not; the cost of the unused portion of a stock of services is not an index of the funds expected to be generated by its use or the sale of it or of its products. Third, a balance sheet representing some assets by net present values and others by unamortized costs is clearly an example of mixed aggregation, and, as such, violates rule 1 of the rules for aggregative measurement. Against mixed aggregation Canning was repeatedly vocal. Yet he found no way of avoiding the solecism.

Chapters XIII and XIV deal with four revaluation techniques—methods of calculating depreciation and depreciated value of durable assets at successive dates. Each is analyzed and some improvements or refinements are suggested. All depend either on an "expected" life or an "expected" output in units of product, which presumably is given by the "buying-holding-operating-selling" matrix of the enterprise. But Canning was aware that this matrix is not a datum. The businessman must "prepare for opportunities that may present themselves, to see them and seize them when they do, and be ready to shift when adversity threatens" (p. 293). "The accountant undertakes to say how well [the businessman] is prepared for whatever *may* happen" (p. 294). It is substantially realistic to say that businessmen should know how well they are prepared for what may happen, and that they must respond to opportunities. But a balance sheet based on present values and unamortized costs does not tell them how well they are prepared; for the former are based on the expected outcome of a specific future (not "whatever may happen"), and the latter are merely calculated residuals having no describable relationship to preparedness for "whatever may happen."

Logical Structure

The reader of a comprehensive study of accounting might be entitled to suppose that a logically tight set of ideas might emerge. Those ideas are embodied in definitions and stipulated relationships between them. Even though Canning's definition of asset is questionable on grounds already given, the definitions of asset, liability, and net proprietorship are relatable. But the notion of income is not relatable to them. Net income is not defined qualitatively; there is therefore no form of words by which it may be related to the terms of other definitions. Had net income (or, alternatively, earnings) been defined as the increment in a period in net proprietorship, the whole set of basic terms would have been interlocked; they would have represented a coherent set of ideas. Such an interlocking may have led to some discussion of the maintenance of capital (or of net proprietorship). That notion was not novel; it had appeared, for example, in works referred to by Fisher [1906] and in Paton [1922], to name just two sources known to Canning. But Canning did not discuss it.

Some aberrations from the rules of aggregative measurement have already been noticed. A further example may be given. Canning was aware that the "magnitude" of the dollar is variable. He said that economists "prefer . . . a purchasing power accounting" and was of the opinion that accountants would do the same (p. 196). Whatever their preferences, the rules of aggregative measurement (rules 2 and 3) require that the money units in an aggregative statement should be units of common significance. Canning made no suggestion that might satisfy those rules. Even in the context of a scheme based on capital values, some such suggestion could have been made; for the capital values of assets calculated at the beginning and the end of a period would have been calculated in terms of dated dollars of different purchasing powers. That the "adjustment data" may not become available in time for reporting, as Canning suggests (pp. 196–197), should not have prevented inclusion of an adjustment term in the suggested "ideal statistical treatment of income" outlined in a previous section.

Further still, the calculated capital values of assets, to a date no further distant than the "duration of the wealth source," entails discounted values over periods of varying length. This also results in aggregations of individual measures of different significance and different possible degrees of error.

It is worth noting that most of the critical observations made are founded on propositions enunciated by Canning himself. That, however, is nothing more than the unenviable lot of any who tread a new path—and only once. There was no cluster of writings before his book which may have provoked reconsideration, on his own part, of his emergent ideas; and no subsequent analysis by others or restatement by himself which may have elucidated those ideas or modified them. I mean no blame by that. The advancement of knowledge and technology is a social matter, in which many minds make light work. Perspicacity, ingenuity, inventiveness, diligence, and rigor are seldom to be found in equal and full measure in one man. Canning displayed a goodly share of them all. But Horace observed that even Homer nods.

The Consequences of Canning

Reviewers of the book shortly after its publication referred to it as a pioneering work [Beatty, 1930; Meriam, 1931]. They did not find evaluation of it easy, but certainly it was provocative. Exhaustive analysis and definitive conclusions were not to be expected of such a work, said Meriam.

Accountants only a few years later began to codify accounting doctrine. The American Accounting Association's "A Tentative Statement of Accounting Principles" [1936] came down strongly in favor of asset valuation at unamortized cost. That doctrine became firmly entrenched in textbook writing and practice. There was no hint that Canning's ideas on valuation and income calculation were known, or, if known, were worthy of notice. Some of those ideas later seeped into academic discussion, and quite recently have appeared in proposals for accounting reform. But it is likely that this intrusion came by way of other sources than Canning. Only one of the many collections of "readings" I have seen has a selection from Canning. Deinzer [1965] includes one passing reference to his book; Hendriksen [1970] has a handful of references; and Chatfield [1977] lists Canning once—in one of its bibliographical lists.

But Canning's work was and is much more significant than this suggests—not for what it proposed by way of improved practice (for much of that is questionable), but for the two main disciplinary ideas mentioned earlier in this article. Those ideas are altogether pervasive in import. They and Canning's pertinent criticisms of theory and practice could have served as points of departure for increasingly rigorous attempts to reconstruct accounting. Yet, 50 years later, the same criticisms may be made, notwithstanding the intervening experience of scores of reported cases of grossly misleading financial statements, and notwithstanding the expenditure of millions on the search for better standards and a better theory.

That search has been befogged by confusion of the different but complementary roles of past information, present facts, and future prospects in the decision-making process. The linkage between accounting and economics cannot be properly established unless those roles are specified. Past values or prices and presently observed values or prices are necessary for the determination of past results and present position; presently observed values or prices and calculated net present values of future alternatives are necessary for the exploration of the feasibility and desirability of future alternatives. None of the three kinds of "values" is a substitute for the other. Had the distinct functions of all three been identified by Canning, as a prelude to "the economics of accountancy," there may have been, by now, a more disciplined attack on that part of accounting which concerns itself with statements of past results and present position from time to time.

With all the goodwill, energy, and money spent or available to be spent on betterment, significant progress is unlikely to be made without "going back to fundamentals," as Canning suggested. If, at last, the necessity of rigorous definition and argument, and the discipline of the rules of aggregative measurement, come to be acknowledged, we may yet have a better theory and a better practice.

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Notes

Some Evidence on the SEC's System of Continuous Disclosure

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ABSTRACT: During the 1970s, the SEC expanded the scope of required disclosure and initiated what might be loosely described as a "continuous disclosure system." This note reviews key aspects of the "continuous disclosure" of unusual events in light of the Hakansson [1977] framework and addresses the issues of the manifestation of the continuous disclosure policy, the type of new information required, the timeliness of that information, and the use of mandated information by investors. The evidence indicates that SEC disclosure policy does meet the minimum conditions for utility.

Hakansson [1977] provides a theoretical framework for assessing conditions where mandatory disclosure of information on an interim basis will be beneficial to most classes of financial statement users, especially those who lack access to "inside information" or the means to pay those who are privy to such information. However, Hakansson [1977] stresses that the utility of interim information to less privileged classes of investors is dependent on its relevance and timeliness.

During the 1970s, the Securities and Exchange Commission (SEC) has expanded the scope of required disclosure and has initiated what might be loosely described as a "continuous disclosure system." Lurie and Pastena [1977–78] point out that the SEC's Accounting Policy Division believed that timely disclosures of unusual events were especially important because these unusual events were far less predictable than were components of continuing income. Not surprisingly, many of the SEC initiatives toward implementing a system of "continuous disclosure" pertained to unusual events.

This note reviews key aspects of the "continuous disclosure" of unusual events in light of the Hakansson [1977] framework. Four major questions are addressed. They are:

1. How did the SEC manifest its "continuous disclosure policy?"

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2. Was new information disclosed as a result of SEC initiatives?
3. Did the SEC initiatives lead to the more timely reporting of information?
4. Was the mandated information used on a timely basis?

THE CONTINUOUS DISCLOSURE SYSTEM

In the 1970s, the SEC strengthened its requirements for both formal and informal disclosure of unusual events. Registrants were required to make formal reports about unusual events to the agency through the SEC's "current report," better known as Form 8-K. Informal disclosures were to be made through timely press releases.

During the study period of February 1973 through February of 1975, the SEC using its authority under the Securities Exchange Act of 1934 mandated that a Form 8-K be filed within ten days subsequent to the close of the month in which a designated material event occurred. Since the agency specified that material events which affect the income statement directly be filed under Item 10(a) of the 8-K, this study focuses on this 8-K item.[1]

The SEC strengthened its formal disclosure system for unusual events by revising Item 10(a) through the issuance of Accounting Series Release 138 (ASR 138). ASR 138 expanded the criteria to be used in determining reportable events to include "material write-downs of inventories, receivables, or deferred research and development costs, provisions for loss on major long-term contracts or purchase commitments, and losses on disposition of assets or business segments." Also, the agency urged management to make early formal disclosure of problems of an incipient nature rather than delay disclosure until the charge or credit was certain.

Besides expanding the scope of items to receive special form 8-K disclosure, ASR 138 augmented disclosure requirements to include: (1) the date of the registrant's determination to make the the charge, credit, or provision; (2) the reasons for the determination; (3) an analysis of the components of the charge, credit, or provision; (4) the present and future income effects of the decision; (5) the present and future cash flow effects of the decision; (6) the accounting principles followed; and (7) a statement from the registrant's certified public accountants commenting whether the 8-K filing is in conformity with generally accepted accounting principles.

In addition to requiring the formal disclosure of charges and credits to income through Item 10(a) of the 8-K, the SEC has demanded that material events be disclosed on a timely basis through the issuance of press releases. In 1933 Act Release No. 5092, issued in 1970 and entitled "Timely Disclosure of Material Corporate Developments," the SEC stated that management has an

> . . . obligation to make full and prompt announcements of material facts regarding the company's financial condition. . . . It should be noted that unless adequate and accurate information is available, a company may not be able to purchase its own securities or make acquisitions using its securities, and its insiders may not be able to trade its securities without running a serious risk of violating Section 10(b) of the Securities Exchange Act of 1934 and Rule 10b-5 thereunder.

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[1] Through the issuance of 1934 Securities Exchange Act Release No. 13156, the SEC has revised the 8-K effective as of February 28, 1977. The revised 8-K will contain only six items and unusual events which affect income may be reported under Item 5 entitled "Other Material Events." It is expected by the author that the stringent disclosure requirements imposed on unusual events by ASR 138 may be applied to unusual events reported under the new Item 5; however, the disclosure system is now voluntary. Whether the conclusions of this study which are applicable to the pre-March 1977 mandatory disclosure system apply to the new voluntary system should be a focus of future inquiry.

The importance of timely and accurate press releases has been emphasized throughout the 1970s. Both 1934 Act Release No. 12619, issued in September of 1976, and 1934 Act Release No. 13156, issued in February of 1977, repeated key portions of 1933 Act Release No. 5092. In addition, other recent SEC releases called for the timely disclosure of the impact on registrants' financial statements of inflation, compliance with anti-discrimination laws, labor problems, and shortages of vital materials.

Apparently, the SEC expects that investors will use formal and informal disclosures in conjunction with each other. Current disclosure laws require that registrants disclose material developments immediately through informal press releases and provide a more detailed disclosure in approximately one month through Form 8-K. Potentially, the veracity of the informal disclosures is enhanced because these informal disclosures will be amplified by timely formal filings with the SEC.

WAS NEW INFORMATION AVAILABLE?

Academic critics such as Benston [1969] have emphasized that much of the SEC mandated disclosure system pertains to historically oriented accounting information which is untimely and quite irrelevant in meeting the needs of investors. In contrast, in ASR 138 the SEC required the production of future-oriented information such as income and cash flow projections. While Lurie and Pastena [1975] indicate that there was some non-compliance in the production of future projections in 1973, more recent work [Pastena, 1976] indicates that compliance improved in 1974.

Another innovation of the SEC in ASR 138 was to introduce auditors to the interim reporting process. Whereas in ASR 177 the agency requires retroactive auditor review of quarterly results in a footnote to Form 10-K, in ASR 138 the SEC requires auditor involvement in the ten to 40-day period subsequent to the occurrence of an Item 10(a) event because the auditor's opinion on the propriety of the accounting treatment utilized is an integral component of the Form 8-K. Thus, not only was new information available to investors, but the reliability of that information was potentially greater because of auditor review.

THE TIMELINESS OF DISCLOSURE

The SEC did require the reporting of unusual charges and credits to income through Form 8-K prior to the promulgation of ASR 138 in 1973, but in ASR 138 the SEC stressed "timely disclosure of incipient problems." In fact, the SEC noted a pattern of very late disclosure of problems both through formal 8-K reports and informal press releases prior to the issuance of ASR 138 and findings from Pastena [1976] confirm the SEC's conclusions. For example, in 1972, 73 percent of the unusual events reported to the SEC through Form 8-K represent adjustments to the fourth fiscal quarter income. In contrast, in the 24 months or eight fiscal quarters subsequent to the issuance of ASR 138, only 34 percent of the unusual items reported through Form 8-K represent adjustments to fourth quarter income.

Major differences emerge when one examines the timing of those press releases associated with the above Form 8-K disclosures. In 1972, 70 percent of these press release disclosures of unusual events were reported in *The Wall Street Journal* (WSJ) after the close of the registrant's fiscal year. On the other hand, in the two-year period subsequent to the issuance of ASR 138, only 28 percent of the press release disclosures of unusual events appear in the WSJ after the close of the registrant's fiscal year. While these results do not contradict the conclusion of Lurie and Pastena [1977–78] that management retains considerable discretion as to the timing of the disclosure in spite of ASR 138, the findings do indicate that this discretion was narrowed by ASR 138.

THE TIMELY USE OF MANDATED DISCLOSURE

To demonstrate that SEC disclosure requirements pertaining to unusual events are beneficial to society as a whole would require a comprehensive analysis of benefits and related costs. This ambitious task is not attempted here. Rather, this study ascertains if early informal and formal disclosures are used by investors. While the use of SEC mandated information by investors is not sufficient to argue for the efficacy of SEC disclosure laws, the demonstration of such use is an important prerequisite for efficacy of regulation.

Previous research by Gonedes [1975] and Eskew and Wright [1976] explored the informational content of unusual events. Gonedes [1975] used a multivariate test to search for changes in the rate of return of those firms which provided separate disclosure of unusual items in their 1962 through 1966 annual reports. The major findings of this study imply that information about unusual events is impounded into stock prices and the sign of the unusual item is significant. However, no attempt was made by Gonedes [1975] to determine if the observed change in the rate of return was a reflection of market reactions to early disclosures of unusual events, if any, as opposed to the presence of the unusual events in the annual report.

Eskew and Wright [1976] researched market reactions to disclosures of extraordinary items in the 1967 to 1972 period. This study traced the risk-adjusted rate of return of registrants reporting extraordinary items of different signs and different categories in their annual report. The research results confirm the finding of Gonedes [1975] that the sign of the extraordinary items is reflected in stock prices and provides evidence that the magnitude of the market adjustment varies with the type of extraordinary item. Like Gonedes, the focal point of their study is the annual earnings announcement.

The current work differs from the previous studies in respect to the time period studied, the types of items studied, and the current focus on the market's reaction to the SEC's early disclosure system. The current sample period encompasses a time when the SEC was expanding the scope of the disclosure system. As opposed to the separately disclosed annual report items studied by Gonedes or the extraordinary items studied by Eskew and Wright, the current sample is comprised of items for which a special 8-K report was filed with the SEC. Finally, the current study attempts to measure the instantaneous market reaction to the disclosure of SEC mandated information.

The sample period began February 28, 1973, the effective date of ASR 138, and extended for a period of two years from that date. An attempt was made to analyze all Item 10(a) filings by S&P 425 companies during the sample period. A total of 258 filings were abstracted from the *SEC News Digest*; however, only 58 of those filings were suitable for empirical testing of the stock price effects of Item 10(a) disclosures because of the necessity to locate a definite announcement date in the WSJ and to eliminate announcements which were made within the five days of earnings forecast announcements, annual and quarterly earnings announce-

TABLE I

LIST OF REGISTRANTS MAKING ITEM 10(a) WALL STREET JOURNAL ANNOUNCEMENTS

Addressograph-Multigraph Corp.
Allied Chemical Corp. (2)
American Broadcasting Company
American Telephone & Telegraph Co.
ASARCO Inc. (2)
Bendix Corp.
Boise Cascade Corp.
CPC International Inc.
Celanese Corp.
Cerro Corp.
Cities Service Company
Control Data Corp. (Del)
Crane Company
Del Monte Corp.
Eastman Kodak Co.
Fedders Corp.
Federal-Mogul Corp.
First Charter Financial Corp.
Gamble-Skogmo, Inc.
Getty Oil Co.
Grace (W. R.) & Co.
Heinz (H. J)) Company
Hilton Hotels Corp.
Household Finance Corp.
International Telephone & Telegraph Corp. (2)
Iowa Beef Processors, Inc.
Johnson (Howard) Co.
Kaufman & Broad Inc. (3)
Litton Industries, Inc. (2)
Lykes-Youngstown Corp.
Martin-Marietta Corp.
Meredith Corp.
Mobil Oil Corp.
National Distillers & Chemical Corp.
North American Coal Corp.
Pet Inc.
Pittston Company (2)
Pullman, Inc. (2)
Reynolds Metals Company
Schlitz (Jos.) Brewing Co. (2)
Sherwin-Williams Co.
Spring Mills, Inc. (2)
Talcott National Corp.
Time, Inc.
Union Carbide Corp.
United States Gypsum Co.
Westinghouse Electric Corp.
White Motor Corp.

ments, or dividend announcements. Table I lists the sample registrants, and Table II specifies the types of events constituting the empirical sample.

TABLE II

COMPARISONS OF POPULATION OF 258 VERSUS THE EMPIRICAL SAMPLE OF 58

Type of Announcement	*Population Frequency*	*Empirical Sample Frequency*
Write-Downs of Assets	12%	10%
Litigation Settlements	2	7
Sale of Segments	17	12
Discontinuation of Segments	17	29
Sale of Investments or Property	12	24
Change in Accounting Principle	8	4
Adjustments of Previously Reported Charges or Credits	10	3
Operating Events	2	5
Losses on Long-Term Contracts	4	4
Loss Carryforwards	4	0
Impairments in the Value of an Investment	3	0
Sundry Others	9	2
Total	100%	100%

All frequencies are rounded.

Methodology

The methodology of this analysis assumes market efficiency in the semi-strong form, *i.e.*, that publicly available information is fully impounded rapidly into stock prices. Applying this assumption, statistical tests then ascertain whether the stock price fluctuations of the sample companies in periods of formal and informal Item 10(a) disclosures are greater than the companies average stock price fluctuations. The measure of stock price fluctuation is the magnitude as opposed to the direction of price changes because of the desire not to further reduce the empirical sample of 58 events by partitioning it into positive and negative sub-samples.[2]

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[2] Focus on the absolute value or magnitude of stock price fluctuations is well established in accounting literature. See Beaver [1968], May [1971], Jordan [1973], and Patell [1976].

Since market-wide movements have a major effect on the day-to-day fluctuations of any given stock, the use of the familiar market model eliminates market-wide price changes and isolates market reaction to firm specific information. The residual of the market model ($e_{j,t}$) represents investor reaction at time t to firm specific information about firm j.

$$e_{j,t} = P_{j,t} - (A_j + B_j M_t) \qquad (1)$$

where $P_{j,t}$ represents the rate of return on stock j for period t and M_t represents the rate of return of the market for period t. B_j represents the volatility of stock j, which is the covariance of the return on stock j and the return on the market divided by the variance of the market. A_j is a regression determined intercept. Stock price fluctuations in the 81-day period around Item 10(a) disclosures were excluded from the process of estimating B_j. Since the residuals will be used for purposes of statistical testing, the standard regression assumptions in respect to residuals of zero expected value, serial independence and homoscedasticity are required.

For purposes of statistical hypothesis testing, the $e_{j,t}$ are transformed and subsequently tested using a method suggested by Patell [1976]. The resulting residuals ($U_{j,t}$) are defined as follows:

$$U_{j,t} = \frac{e_{j,t}^2}{S_j^2 \cdot C_{j,t}^2} \cdot \frac{T-4}{T-2} \qquad (2)$$

where T represents the number of daily returns used in regression parameter estimation, S_j^2 represents the variance associated with the returns of company j, and $C_{j,t}^2$ represents a statistical correction factor.[3]

As defined above, the expected value of $U_{j,t}$ equals one. Thus, this study employs a parametric Z Test to determine if the mean $U_{j,t}$ (U STAT) associated with the 58 Item 10(a) disclosure periods is statistically greater than one. A positive result is consistent with the conjecture that the market does use Item 10(a) information in setting equilibrium prices.

Hypotheses

Since the SEC requires both informal and formal disclosure of unusual events, market reactions to these two different types of disclosure are tested separately. In the test of investor use of the informal disclosure system, the null hypothesis is that the U STAT associated with periods of Item 10(a) disclosure in the WSJ is equal to one while the alternative hypothesis is that the U STAT is greater than one. Correspondingly, in testing investor reaction to formal disclosures, the null hypothesis is that the U STAT associated with periods of formal Item 10(a) filings with the SEC is equal to one while the alternative hypothesis is that the formal period U STAT is greater than one.

In order to capture the instantaneous market reaction to Item 10(a) disclosures, relatively short disclosure periods of three days are used in the statistical testing. In the test of the informal disclosure hypothesis, the three-day test period consists of the day before the informal press release, the day of the press release and the subsequent day when notice of the press release appeared in the WSJ. In the formal disclosure test, the three-day period constitutes the day the Form 8-K was received by the New York Stock Exchange (NYSE) and the two subsequent days. Inquiry at the NYSE confirmed that registrants send their Form 8-K filings

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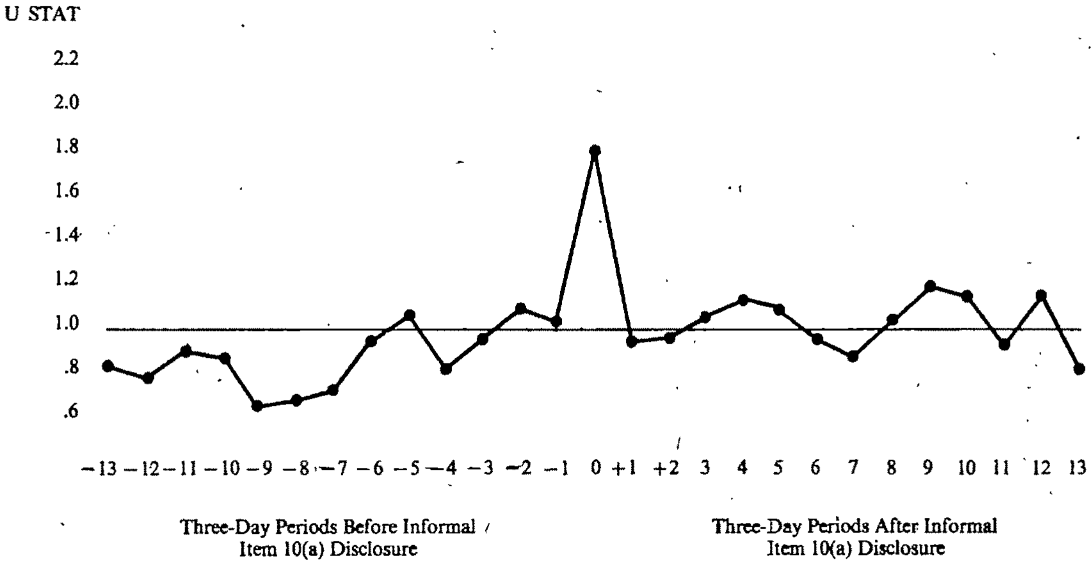
[3] The $C_{j,t}$ factors partially compensate for the differences in the magnitude of the variances of the rates of return associated with different sample companies. The $C_{j,t}$ factors varied from 1.001 at the .1 decile to 1.009 at the .9 decile. See Patell [1976] for a more complete treatment of the derivation and meaning of the $C_{j,t}$ factor.

FIGURE 1



to the SEC in Washington and the NYSE simultaneously.

Two non-parametric tests, the binomial and the Wilcoxon Signed Rank, are employed to confirm results obtained through the parametric *Z* Test. Non-parametric tests are an important supplement to parametric results because non-parametric tests are far less likely to reject the null hypotheses because of a few extreme market reactions to Item 10(a) disclosures. In the binomial test, the U STATS associated with the three Item 10(a) disclosure days are statistically tested against the U STATS associated with the 81-day period around the disclosure. In the Wilcoxon Signed Rank Test, the market reaction to 10(a) disclosures is compared to the market reaction to the three quarterly earnings announcements and the annual earnings announcement of the same fiscal year.

Results and Interpretation

Both the parametric *Z* Test (at the .001 level of significance) and the non-parametric binomial test (at the .02 level of significance) support the alternative hypothesis that market fluctuations in *informal* Item 10(a) disclosure periods are greater than would be expected in a typical or average three-day period. The market fluctuations of U STATS in the 81-day period around Item 10(a) disclosure are depicted in Figure I. Also, the results of the Wilcoxon Signed Rank Tests could not reject the hypothesis that the market's reaction to Item 10(a) disclosures is greater than for annual or interim earnings announcements. However, all parametric and non-parametric testing supports the null hypothesis that market fluctuations in periods of *formal* Item 10(a) disclosure are not greater than in the typical or average three-day period.

These results provide strong support for the contention that the informal disclosure system is used by investors but do not proffer evidence of instantaneous SEC mandated formal disclosures. It is possible that the three-day period was too short to capture market reaction to formal disclosure; however, given the previous market reaction to the earlier informal disclosures, it is probable that the market had already fully reacted to new information by the time of the formal filing. If so, the formal disclosures provide their greatest function by giving management an incentive to be candid and complete in their earlier press release disclosures.

GENERAL CONCLUSION

This study provides evidence that the SEC disclosure system for unusual events: (1) encouraged the production of relevant information, (2) induced the dissemination of information on a more timely basis, and (3) mandated the dissemination of information that was used by investors. Having displayed these characteristics, the disclosure system satisfies the key prerequisites set up by Hakansson [1977] for efficacy in meeting the needs of investors. Of course, a definitive statement as to the desirability of regulation requires a detailed cost benefit analysis and that is a goal of future research.

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A Linear Programming Framework for Cost Allocation and External Acquisition when Reciprocal Services Exist

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ABSTRACT: This paper views the external acquisition of services as a variation of the traditional make-buy problem. A linear programming framework for external acquisition is proposed which generalizes the traditional make-buy model by incorporating the simultaneous equation relationships for reciprocal services. Using linear programming results it is possible to determine whether external acquisitions are economically attractive and in what quantity. In addition, this paper demonstrates how to use the linear programming results to compute cost allocations, even when some overhead services are purchased externally.

INTRODUCTION

In their paper, Capettini and Salamon [1977] (hereafter C&S) discuss the internal versus external acquisition of services in the presence of reciprocal services. Their main purpose is to demonstrate that many of the relevant data for decisions on external acquisition are produced by the simultaneous equation method of cost allocation. This fact tends to support the use of the simultaneous equation method (rather than the direct or step methods) since it provides information that is also useful in decision-making. C&S do note, however, that even the simultaneous equation method has its limitations, such as its inability to produce data on cost savings when there is simultaneous acquisition of two or more services.

We take the position that the external acquisition of services can be viewed as a variation of the traditional make-buy problem commonly taught in production or in managerial accounting. When linear technologies apply, as in the application of the simultaneous equation method of cost allocation, the most appropriate economic model for the evaluation of make-buy decisions is a linear program (LP). In particular, the LP framework is a generalization of the simultaneous equation method which provides cost allocations as well as complete answers to the relevant economic questions involving external acquisition. In addition, the general LP model provides cost allo-

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cations that include the purchase cost of external services.

In what follows, the reader is assumed to be familiar with the accounting phenomenon of reciprocal relationships among service centers (or departments) which provide direct support to a set of production activities.[1] For simplicity, all indirect costs are assumed to be variable costs (*i.e.*, linear costs), as discussed in Kaplan [1973], although the concepts can be extended to non-variable costs in the spirit of the example given by C&S [1977, p. 693]. Finally, the make-buy framework advocated here can readily be applied with the support of information systems that contain a computer program for LP.

AN LP STRUCTURE FOR RECIPROCAL SERVICES

In order to provide a linear programming interpretation, we begin by associating one equality constraint with each type of service output. Let m denote the number of service departments, and let

x_j = the number of output units from service department j

b_i = the number of output units from service department i directly required for the total production output.

c_j = the unit cost of output from service department j.

a_{ij} = the number of output units from service department i required for one unit of output from department j.

The total cost of all service department outputs will then be

$$z = \sum_{j=1}^{m} c_j x_j \qquad (1a)$$

The typical constraint is of the form

$$x_i - \sum_{j=1}^{m} a_{ij} x_j = b_i \qquad (1b)$$

The left-hand side of this constraint is the service output from department i, net of output to other service departments; this is the quantity available to be directly supplied to meet production requirements. The right-hand side is the direct production requirement. Thus, while x_i represents the total (direct and indirect) output of department i, the relationship in the equation assures that the output provided to production departments is equal to their direct requirement. This model is a very special type of linear program in that the constraints consist of m equations in m unknowns. There will be only one solution to this system of equations and therefore only one value of z.

The LP framework allows the analyst to represent the reciprocal pattern of services in equation form, and it permits an evaluation of the external acquisition of a service in any amount by using the shadow price as a break-even unit price. The maximum desirable quantity for external purchase can be determined from ranging analysis of the constraint constants in the LP. The results of such an analysis will, of course, be identical with those produced by C&S [1977] and by Kaplan [1973], since the LP framework is merely a different interpretation of the same economic problem.

An alternative approach to formulating the model is to include the external purchase quantities as explicit variables, thus giving rise to a general make-buy formulation. Specifically, let:

v_j = quantity of service j to be purchased externally, and

p_j = unit price for service j when purchased externally.

The extended LP formulation includes the cost of external purchases in the objective function and permits external purchases to substitute for (net) internally generated quantities:

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[1] Concise descriptions can be found in C&S [1977] and also in Morse [1978].

minimize

$$z = \sum_{j=1}^{m} c_j x_j + \sum_{j=1}^{m} p_j v_j \qquad (2a)$$

subject to

$$x_i - \sum_{j=1}^{m} a_{ij} x_j + v_i = b_i \qquad (i = 1, 2, \cdots, m) \quad (2b)$$

The left-hand side of equation (2b) is the net service output from department i, augmented by the quantity of the same type of service that is purchased externally. As in equation (1b), the right-hand side is the direct production requirement. Limitations on the purchase quantities might also be imposed by external market considerations or by internal policies; these can be reflected by upper bound constraints on the variables v_i.

COST ALLOCATIONS AND THE LP STRUCTURE

Simultaneous equation methods for allocating service department costs to producing departments are particulrly appropriate when reciprocal service patterns exist. This type of allocation procedure may be conceived as having two phases: (1) compute the flow-through costs[2] associated with each service department, and then (2) distribute these costs to the producing departments on the basis of relative usage. To formalize our interpretation of this procedure, we adopt the following notation:

S_j = flow-through costs for the jth service department, $j = 1, 2, \cdots, m$.
K_j = direct cost incurred at the jth service department.
e_{ij} = proportion of total output rendered by service department i that goes to support service department j.

The flow-through costs S_j are defined by the following set of m equations:

$$S_j = K_j + \sum_{i=1}^{m} e_{ij} S_i \qquad (3)$$

Equation (3) defines the flow-through cost of the jth service department as the sum of its direct cost and an appropriate proportion of the flow-through cost for each of the departments. However, from our earlier definitions we have:

$$K_j = c_j x_j \qquad (4)$$

$$e_{ij} = \frac{a_{ij} x_j}{x_i} \qquad (5)$$

Therefore, Equation (3) becomes:

$$S_j = c_j x_j + \sum_{i=1}^{m} \frac{a_{ij} x_j}{x_i} S_i \qquad (6)$$

$$\frac{S_j}{x_j} - \sum_{i=1}^{m} a_{ij} \frac{S_i}{x_i} = c_j \qquad (7)$$

Substituting the variable S'_j for the ratio S_j/x_j, we obtain

$$S'_j - \sum_{i=1}^{m} a_{ij} S'_i = c_j \qquad (8)$$

This system of m equations in the m variables S'_j is identical to the set of equations that comprise the dual linear program associated with (1a) and (1b). In other words, the value of S'_j is identical to the dual variable (or shadow price) y_j. Thus we have:

$$S'_j = y_j \qquad (9)$$

and

$$S_j = S'_j x_j = y_j x_j. \qquad (10)$$

In words, the flow-through cost for service department j is simply the product of the jth quantity variable and the jth shadow price in the LP (1a, 1b).

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[2] Kaplan [1973] refers to these as "redistributed" service costs, while C&S [1977] call them "unadjusted" cost allocations.

For the C&S example the LP model is:

$$\begin{aligned} \text{minimize } z &= 0.0133x_1 + 0.1x_2 + 0.01x_3 \\ \text{subject to } \quad x_1 - 0.5x_2 &= 60{,}000 \\ x_2 - 0.15x_3 &= 90{,}000 \\ -0.8x_1 + x_3 &= 480{,}000 \end{aligned} \tag{11}$$

From an LP routine, the solution is found to be:

quantity variables	*shadow prices*	*objective function*
$x_1=150{,}000$ gal.	$y_1=0.03546$	$z=26{,}000$
$x_2=180{,}000$ cu. ft.	$y_2=0.11773$	
$x_3=600{,}000$ kw-hrs.	$y_3=0.02766$	

From (10) we also obtain:

Department j	y_j	x_j	S_j
1	.03545	150,000	5,319
2	.11773	180,000	21,191
3	.02766	600,000	16,596

These allocations S_j agree with those produced by C&S and by Kaplan on the same example. Note that another form for the relationship in (8) is now seen to be:

$$y_j = c_j + \sum_{i=1}^{m} \frac{e_{ij}S_i}{x_j} \tag{12}$$

In words, this equation states that the marginal cost of output from service department j is equal to direct cost per unit plus the sum of costs allocated to department j on a per unit basis.

The second step in cost allocation requires that the unadjusted allocations be distributed to the production departments. Note that it was sufficient in the LP model (1a, 1b) to utilize *aggregate* output b_i from service department i to *all* production departments. For product costing however, it is necessary to distinguish among the production departments. Let n denote the number of production departments, and define:

u_j = the number of output units from production department j.

b_{ij} = the number of output units from service department i directly required for one unit of output from production department j.

In the light of the notation introduced earlier, this means:

$$b_i = \sum_{j=1}^{n} b_{ij}u_j \tag{13}$$

In addition, we can define terms which are analogous to those introduced earlier but which apply to production departments.

P_j = overhead cost allocated to production department j. [analogous to S_j]

r_{ij} = proportion of output rendered by service department i that goes to support production department j. [analogous to e_{ij}]

With this notation, the desired overhead cost to be allocated to production department j is given by[3]:

$$P_j = \sum_{i=1}^{m} r_{ij}S_i \tag{14}$$

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[3] This phase of cost allocation is not explicitly treated by C&S, but a comparable discussion can be found in Kaplan [1973] and Morse [1978, Ch. 3].

By a series of arguments analogous to those represented in equations (6)–(9) we obtain:

$$P_j = \sum_{i=1}^{m} \frac{b_{ij}u_j}{x_i} S_i = u_j \sum_{i=1}^{m} b_{ij} \frac{S_i}{x_i}$$

$$= u_j \sum_{i=1}^{m} b_{ij} y_i \tag{15}$$

In the C&S example, this allocation is trivial because there is only one production department; however, using (15) we can verify that its overhead allocation is:

$$\begin{aligned} P_1 &= u_1(b_{11}y_1 + b_{21}y_2 + b_{31}y_3) \\ &= 100{,}000[0.6(0.03546) + 0.9(0.11773) \\ &\quad + 4.8(0.02766)] \\ &= 26{,}000 \end{aligned} \tag{16}$$

This figure, of course, represents the total overhead cost incurred at the three service departments.

In order to demonstrate how the LP framework allows for product costing when there is more than one department, consider the numerical example in Table 1, which contains four service departments with reciprocal patterns of support and two production departments. The top portion of Table 1 gives the technological coefficients describing output relationships between service-production department pairs. The respective internal costs and external prices are also shown.

Suppose that the output volumes for the production departments are $u_1 = 1000$ and $u_2 = 2000$. We begin the analysis by excluding external purchases, leading to the following LP model:

TABLE 1

PARAMETERS FOR THE NUMERICAL EXAMPLE

		Servive Departments			
Units required per unit of: Service		S1	S2	S3	S4
	S1	—	0.24	0.15	0.05
	S2	0.12	—	0.10	0.15
	S3	0.05	0.10	—	0.25
	S4	0.08	0.06	0.04	—
Production	P1	11.0	5.0	7.0	14.0
	P2	5.0	4.0	7.0	5.0
Unit Cost (internal)		$4.00	$3.00	$2.00	$1.00
Unit Price (external)		$5.25	$4.22	$3.14	$1.80

A computerized LP routine yields the solution below:

Quantities	*Shadow Prices*	*Internal Cost*
$x_1 = 28{,}367$	$y_1 = 5.589$	$z = 283{,}081$
$x_2 = 24{,}916$	$y_2 = 4.261$	
$x_3 = 29{,}205$	$y_3 = 3.163$	
$x_4 = 36{,}457$	$y_4 = 1.829$	

From this analysis we conclude that in the absence of external purchases the total internal service cost will be $283,081 based on the output quantities given as x_1, x_2, x_3, and x_4.

In order to allocate service costs according to the simultaneous equation method for cost allocation, we perform the following calculations:

$$\text{Flow-through Costs: } S_j = y_j x_j \tag{10}$$

$$\begin{aligned} S_1 &= 5.589(28{,}367) = 158{,}543 \\ S_2 &= 4.261(24{,}916) = 104{,}896 \\ S_3 &= 3.163(29{,}205) = 92{,}375 \\ S_4 &= 1.829(36{,}457) = 66{,}680 \end{aligned}$$

$$\begin{aligned} \text{minimize } z = {} & 4.00x_1 + 3.00x_2 + 2.00x_3 + 1.00x_4 \\ \text{subject to } \quad & x_1 - 0.12x_2 - 0.05x_3 - 0.08x_4 = 21{,}000 \\ & -0.24x_1 + x_2 - 0.10x_3 - 0.06x_4 = 13{,}000 \\ & -0.15x_1 - 0.10x_2 + x_3 - 0.04x_4 = 21{,}000 \\ & -0.05x_1 - 0.15x_2 - 0.25x_3 + x_4 = 24{,}000 \end{aligned} \tag{17}$$

$$\text{Cost Allocations: } P_j = u_j \sum_{i=1}^{m} b_{ij} y_i \quad (15)$$

$$P_1 = 1000[11(5.589)+5(4.261)+7(3.163)+14(1.829)] = 130{,}531$$

$$\begin{array}{l} P_2 = 2000[5(5.589)+4(4.261)+7(3.163) \\ \qquad +5(1.829)] = \underline{152{,}550} \\ \qquad\qquad\qquad\quad\; 283{,}081 \end{array}$$

When we examine the possibility of external purchases, we began with a comparison of external prices and break-even values:

Service	1	2	3	4
B/E Price	\$5.59	\$4.26	\$3.16	\$1.83
External Price	\$5.25	\$4.22	\$3.14	\$1.80

We conclude that the external purchase of all four services should be investigated since each external price is attractive at the margin. We proceed by formulating the general LP model for the make-buy analysis:

minimize

$$z = 4.00x_1 + 3.00x_2 + 2.00x_3 + 1.00x_4 + 5.25v_1 + 4.22v_2 + 3.14v_3 + 1.80v_4$$

Subject to

$$\begin{array}{lllllllll} x_1 & -0.12x_2 & -0.05x_3 & -0.08x_4 & +\;v_1 & & & & = 21{,}000 \\ -0.24x_1 & \quad x_2 & -0.10x_3 & -0.06x_4 & & +\;v_2 & & & = 13{,}000 \\ -0.15x_1 & -0.10x_2 & +\;x_3 & -0.04x_4 & & & +\;v_3 & & = 21{,}000 \\ -0.05x_1 & -0.15x_2 & -0.25x_3 & +\;x_4 & & & & +\;v_4 & = 24{,}000 \end{array} \quad (18)$$

A computerized LP routine yields the solution below:

Internal Quantities	*External Quantities*	*Shadow Prices*	*Total Cost*
$x_1 = 0$	$v_1 = 26{,}894$	$y_1 = 5.25$	$z = 273{,}975$
$x_2 = 17{,}361$	$v_2 = 0$	$y_2 = 4.213$	
$x_3 = 24{,}041$	$v_3 = 0$	$y_3 = 3.1333$	
$x_4 = 32{,}614$	$v_4 = 0$	$y_4 = 1.798$	

From this analysis we conclude that the potential for external acquisitions can be exploited to reduce the total cost from \$283,081 to \$273,975 by obtaining service 1 externally at \$5.25/unit. When this purchase is implemented, the cost allocation procedure yields:

Flow-through Costs:	S_1	= 141,194
	S_2	= 73,142
	S_3	= 75,320
	S_4	= 58,640
Cost Allocations:	P_1	= 125,922
	P_2	= 148,053

The significance of the Equation system (15) should not be missed. The formula demonstrates that the desired cost allocations can be determined from three kinds of information:

u_j: the output volume for production department j.
b_{ij}: the technological coefficients describing the relationship between production output in department j and direct service required of department i.
y_i: the shadow prices, from (1a, 1b).

In particular, this approach avoids the need to rely on "proportion-of-output" coefficients such as e_{ij} and r_{ij}, which are commonly the basis in contemporary textbooks on managerial accounting for describing reciprocal patterns of service and for determining cost allocations.[4] The "proportional output" coefficients depend on the scale of activity at the various departments and could be expected to vary each accounting period as the activity levels change. By contrast, the technological coefficients are far less likely to need revision as activity levels change, period to period. In fact, if the relationships between production and service are purely physical (as would be the case for water, steam, and electricity, for example) the coefficients would not vary at all, and there would not be any need to revise the information base as output levels change. The shadow prices, however, would be recalculated by the computer program that solves the LP.

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[4] Although Kaplan [1973] utilizes both the technological coefficients and the proportional output coefficients, he does so mainly to clarify the interpretation

The technological coefficients approach is also useful for evaluating the external acquisition of services. Suppose a firm decides to acquire certain services externally and then wishes to forecast the indirect cost allocations that will result. With the "proportional output" approach, the whole set of coefficients describing the pattern of reciprocal services would have to be revised to reflect the external acquisition. However, with the "technological" approach, no such revision in this portion of the information base is required.

SUMMARY

In this paper, we have presented a linear programming (LP) approach to the problem of acquiring overhead services when reciprocal relationships among services exist. The LP framework generalizes the traditional make-buy model and incorporates the simultaneous equation model for cost relationships in the presence of reciprocity. With the use of a straightforward linear program, we have shown how to determine whether external acquisitions are economically attractive and how to find the quantity of service output that is required to replace internally-generated service output.

In addition, we have shown how to utilize the results of LP analysis to compute allocations of overhead costs to production departments. These computations can be made even when some of the overhead services are purchased externally, as illustrated by the example in the previous section. As a consequence the model not only can evaluate the economic desirability of certain external acquisitions under different planning scenarios, but it also can anticipate how costs would ultimately be allocated under each scenario. Finally, we note that even though we have presented only examples in which self-service costs did not occur, the LP approach can be applied without any changes to cases in which self-service relationships exist.

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of the information produced by cost allocations that use the proportional output coefficients. The advantages of using the technological coefficients for cost allocation as well as for evaluating external acquisition are not explored.

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EDUCATION RESEARCH

Edwin H. Caplan, Editor

EDITOR'S NOTE

Manuscripts submitted to this section should conform to the format described in the April, 1978, issue of THE ACCOUNTING REVIEW. The articles should fall into one of four categories: (1) articles that report empirical research findings regarding learning theory and technique applied in accounting courses at the collegiate level of instructions; (2) articles that report on developments in the field of accounting education, such as those dealing with educational philosophy or descriptive innovations for the classroom; (3) articles dealing with professional development; and (4) articles dealing with practical or theoretical issues directly related to classroom instruction, *i.e.*, providing specific classroom applications.

All manuscripts and correspondence should be sent to Professor L. S. Rosen, York University, 47 Mogul Drive, Willowdale, Ontario M2H 2M8, Canada.

Income Tax Liability: A Classroom Approach

Richard B. Byars

ABSTRACT: Once a taxpayer's taxable income has been determined there are three possible methods of determining income tax liability: (1) the regular method using the appropriate tax schedule, (2) income averaging, and (3) maximum tax. This paper presents a method of explaining these methods by means of tax layers which greatly facilitates student comprehension. A notational method is also suggested which facilitates testing of these concepts. Demonstration of the source of tax savings also facilitates student comprehension.

TABLE 1 presents the data necessary to compute a married taxpayer's income tax liability using the three possible methods: (1) regular method using Schedule Y, (joint return), (2) income averaging, and (3) maximum tax. The tax on the taxable income (TI) of $162,400 is $81,464. This can be denoted as T (164,200). This notational system relieves both the student and the teacher of the burden of computing the tax liability, a process which wastes time, is subject to error, and adds more foliage to the forest.

INCOME AVERAGING

The tax liability which results from income averaging can be described as a layer cake. Table 2 presents a three-layered cake in which: layer 1 is the non-averageable income, layer 2 has a thickness equal to one fifth the averageable

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income, and layer 3 is the balance. The tax liability is the tax on layer 1 plus five times the liability on layer 2. The savings can be explained as the amount of TI which would have been taxed at 64 percent but will instead be taxed at 59 percent.

MAXIMUM TAX

Table 3 is a three-layered cake in which layer 1 has a height equal to the point where TI is taxed at a rate greater than 50 percent, and layer 2 plus layer 1 are equal to personal service taxable income (PSTI). The tax liability is the tax on layer 1 plus 50 percent of layer 2 plus the marginal tax on layer 3. The savings can be explained as the difference between a 50 percent rate and the regular rate for the PSTI that exceeds $60,000, where a marginal rate greater than 50 percent is encountered.

TESTING AND USAGE

Most students calculate the income averaging method, T(90,000) +5 [T(104,480) − T(90,000)], but forget the equation for PSTI and fail to respond T(60,000) + .5 [71,871.41 − 60,000] + T(162,400 − T(71,871.41) for the maximum tax. Asking the student to respond in this manner permits more comprehensive questions to be asked since some of the time required to work the problem has been eliminated by adopting the notation presented here.

At the time the topics in this paper are presented, most instructors would also discuss the minimum tax and the alternative minimum tax. The example given above can be used to cover these topics which are beyond the scope of this paper.

TABLE 1

COMPONENTS OF TAXABLE INCOME

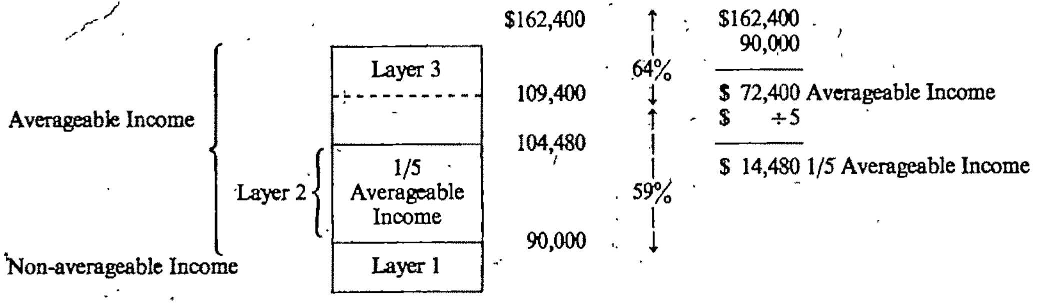
Wages		120,000
Interest Income		14,200
Net Royalty Income		40,000
Itemized Deductions		10,300
Exemptions		1,500
AGI		174,200
TI		162,400
Tax Preferences (depletion)		40,000
Regular Tax =	T(162,400)	= 81,464
19×6 TI	$90,000	
19×5 TI	77,000	
19×4 TI	64,000	
19×3 TI	56,200	

TABLE 2

INCOME AVERAGING

	Original TI	*Adjustment*	*Adjusted TI*
19×6	$90,000	$3,200	$ 93,200
19×5	77,000	3,200	80,200
19×4	64,000	3,200	67,200
19×3	56,200	3,200	59,400
			$300,000
			÷4
		Base Period Average	$ 75,000
			×120%
		Non-averageable Income	$ 90,000

TABLE 2 (*Continued*)



Layer 1 — *5 Times Layer 2*

Non-averageable Income + *5 Times Marginal Tax on 1/5 Averageable Income*

TAX = T($90,000) + 5[T(104,480)−T(90,000)]
= $36,098 + 5[$44,641.2−$36,098]
= $78,814
SAVINGS = $ 2,650 = $81,464−$78,814

Explanation of Savings

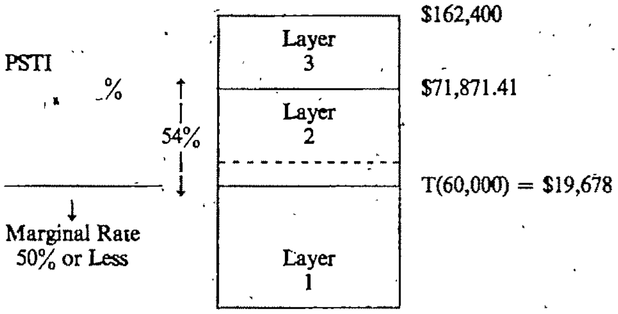
SAVINGS = [64%−59%] × [162,400−109,400]
= .05 × 53,000
= $2,650

TABLE 3
MAXIMUM TAX

$$\text{PSTI} = \frac{\text{Net Personal Service Income}}{\text{AGI}} \times \text{TI} - \text{Tax Preference}$$

$$\text{PSTI} = \frac{\$120{,}000}{\$174{,}200} \times \$162{,}400 - \$40{,}000$$

$$= \$71{,}871.41$$



Layer 1 — *Layer 2* — *Layer 3*

TAX = T(60,000) + .5[71,871.41 − 60,000] + [T(162,400) − T(71,871.41)]
= 19,678 + .5[11,871.41] + [81,464 − 26,088.56]
= 19,678 + 5,935.71 + 55,375.44
= $80,989.15
SAVINGS = $ 474.85

Explanation of Savings

VINGS = [.54 − .50] × [71,871.41 − 60,000]
= .04 × 11,871.41
=
= $474.85

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Public Sector Accounting Education: Status Update and Extension

John H. Engstrom

ABSTRACT: A survey of AACSB-accredited undergraduate and graduate programs revealed that most institutions would like to expand public sector offerings but are unable to do so due to lack of funds and qualified faculty. The demand for faculty qualified to teach public sector accounting will far exceed the supply for the next five years. This supply-demand situation provides a rich opportunity for doctoral candidates.

GRADUATES of accounting programs enter the profession with a background in accounting and other subjects related to the business sector of our economy. Traditionally housed within colleges of business, accounting programs have naturally been considered a part of the field of business administration. Recently, however, the profession has begun to recognize that its services and products apply also to the public sector, including government, colleges, hospitals, public schools, health and welfare organizations, and other not-for-profit entities. The Financial Accounting Standards Board is in the process of considering basic questions relating to non-business accounting [FASB, 1978; Anthony, 1978]. Those who are responsible for the education of accounting professionals are faced with the possibility that curriculum changes may be needed to meet the special needs of public sector organizations. A recent article by Fox [1977] suggested that programs being developed by the new professional schools should consider the needs of governmental units.

Several questions need to be addressed by accounting educators. How well are these special needs being met by accounting programs in American colleges and universities? How many universities offer special courses in accounting for public sector organizations? What is the content of those courses? What materials are being used? If courses are not offered, what are the reasons? Are there sufficient faculty members interested and qualified in public sector accounting, now and in the near future? Do accounting faculties plan to expand course offerings in this area?

A recent article by Holder [1978] reported the results of a survey of AACSB-accredited MBA graduate programs and dealt with some of these questions. Holder reported that the majority of programs did not offer a public sector accounting course and cited the lack of resources as a major limiting factor. Most of the institutions, however, planned to expand graduate public sector offerings in the future. This survey provides support for Holder's conclusions and addresses several additional issues.

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Both undergraduate and graduate programs are included in the study due to the fact that many institutions offer undergraduate courses. In addition, information was gathered regarding the demand for and supply of persons interested in and capable of teaching public sector accounting.

RESEARCH METHODOLOGY

A two-part questionnaire was sent to chairpersons of the 198 accounting programs accredited by AACSB [AACSB, 1977]. Part one, to be answered by the chairpersons, requested data regarding the extent of public sector course offerings and number of qualified faculty members, and asked for opinions regarding future plans. Part two requested data regarding course content from faculty members teaching public sector accounting courses. Including one follow-up mailing, responses were received from 128 of the 198 institutions, but six were unusable, leaving 122, or 61.6 percent usable responses. Even though the response rate was reasonably high, several comparisons were made to test for the possible existence of non-response bias.

The average total enrollments of responding and non-responding institutions was approximately the same (17,222 to 17,079). In addition, the responding institutions have 70.3 percent of the entire population of accounting doctoral students reported by Crum [1978]. Comparisons were also made between the responses to the original and follow-up mailing. Late respondents were less likely (37.5 percent) to have an elective public sector course than respondents to the original questionnaire (54.6 percent). On the average, late respondents had fewer qualified public sector accounting faculty members and fewer interested doctoral candidates but expressed a stronger desire to expand public sector offerings. To the extent that the bias of the late respondents would carry over to the non-respondents, the conclusions of this study, that accounting education is not now meeting public sector needs, would be strengthened.

Along with the 128 responses, 27 course syllabi were returned for analysis as requested in part two of the questionnaire.

RESULTS OF THE SURVEY—PART 1

Present status of course offerings

Table 1 reflects the number and the percentage of responding institutions offering public sector accounting courses. While over half of the institutions offer a separate elective course, only three institutions have a required exposure to public sector accounting. Survey data indicated that the larger accounting programs were more likely to have a public sector course. In addition to the programs for regular students, 56 institutions conduct CPA review programs. Forty-seven of the 56 institutions (83.9 percent) include an average of 4.5 hours of public sector material. Fourteen institutions reported various short courses and professional programs, covering accounting

TABLE 1

PUBLIC SECTOR COURSE OFFERINGS
($N = 122$)

Course Description	*Number of Institutions*	*Percentage*
Public Sector Accounting as a Part of an "Advanced" Course	65	53.3
Public Sector Elective Course	64	52.5
Public Sector Required Course	3	2.5
Advanced Public Sector Course	6	4.9
Public Sector Course for Other Departments	18	14.8
Hospital or Health Care Course	7	5.7
College and University Accounting Course	1	.8
Interdisciplinary Course With Social Work	1	.8

TABLE 2

MAJOR FACTORS LIMITING INCREASE IN PUBLIC SECTOR COURSES

Factor	*Number of Responses**	*Percentage of Total*
Budget constraints	49	27.3
Lack of properly qualified faculty members	44	24.6
Lack of interested faculty members	39	21.8
Lack of student interest	32	17.9
Other	15	8.4
Total	179*	100.0

* Several of the respondents indicated more than one of the factors.

for health care, government, colleges, churches, and public schools. Three institutions offer public sector courses through correspondence.

These results clearly suggest that few American accounting students have a required exposure to public sector accounting. It is possible for many of them to obtain the information through an elective course or a CPA review program.

Factors Limiting Course Offerings

Table 2 generally supports Holder's conclusion [1978, p. 748] that lack of resources (money and faculty) are a major factor limiting the expansion of public sector offerings. It is not clear whether the lack of qualified faculty members is due to a lack of financial resources or other reasons, including a general shortage of faculty members in the field.

Plans for the Future

Department chairpersons were asked to indicate their feelings regarding public sector accounting offerings. Table 3 indicates that the majority (74.6 percent) would like to increase offerings either within a year or during the next five years. Even with the obvious limits of self reports, there is at least an indication that accounting education leaders are responding to the interest of the profession in the public sector.

TABLE 3

DISTRIBUTION OF INSTITUTIONS ACCORDING TO PLANNED PUBLIC SECTOR OFFERINGS IN THE FUTURE

Department Chairperson's Response	*Number of Institutions*	*Percent*
Would like to increase within a year	41	33.6
Anticipate an increase within five years	50	41.0
Satisfied and anticipate no increase	28	23.0
Would like to decrease offerings	1	.8
No response	2	1.6
Total	122	100.0

Supply and Demand of Faculty Members

Table 4 reflects the distribution of reporting institutions according to the number of present faculty members who consider public sector accounting to be a major teaching and research interest. These institutions reported a total of 94 individuals, and there are undoubtedly more in nonresponding and non-AACSB

TABLE 4

DISTRIBUTION OF INSTITUTIONS ACCORDING TO NUMBER OF FACULTY WHO CONSIDER PUBLIC SECTOR ACCOUNTING TO BE A MAJOR TEACHING AND RESEARCH INTEREST

Number of Faculty Members	*Number of Institutions*	*Percent*
0	54	44.3
1	48	39.3
2	17	13.9
3 or more	3	2.5
Total	122	100.0

TABLE 5

NUMBER OF DOCTORAL STUDENTS GRADUATING IN THE NEXT FIVE YEARS WITH A MAJOR TEACHING AND RESEARCH INTEREST IN PUBLIC SECTOR ACCOUNTING

Anticipated Year of Graduation	*Number of Students*
1978	4
1979	8
1980	4
1981	3
1982	3
	22

accredited schools. Table 5 reflects the reported number of doctoral students who have an interest in public sector accounting and their anticipated year of graduation. As might be expected, all but two of the doctoral candidates were in institutions that have one or more qualified faculty members.

Departmental chairpersons were asked to indicate their anticipated additional needs for faculty members who are qualified in public sector accounting. Table 6 reflects a need for 84 faculty members during the next five years. Table 7 summarizes the reported supply-and-demand situation and clearly demonstrates a projected unmet demand. This should provide an incentive for doctoral students to specialize in public sector accounting.

IMPLICATIONS OF THE SURVEY—PART I

If a position is taken that public sector material should be a required part of every accounting graduate's field of knowledge, then accounting education is currently deficient. Shortages of qualified and interested faculty members and of financial resources appear to be the primary causes. Most institutions would like to increase offerings, and one-third of the institutions would like to do so immediately.

TABLE 6

DISTRIBUTION OF INSTITUTIONS ACCORDING TO ANTICIPATED NEED FOR FACULTY MEMBERS WITH QUALIFICATIONS IN PUBLIC SECTOR ACCOUNTING

	Institutions		*Number of Faculty*
Expressed Need	*Number*	*%*	*Needed*
Immediate need	29	23.8	32
No immediate need but anticipate a need within next five years	52	42.6	52
No anticipated need	41	33.6	—
	122	100.0	84

TABLE 7

SUPPLY OF AND DEMAND FOR FACULTY MEMBERS INTERESTED AND QUALIFIED IN PUBLIC SECTOR ACCOUNTING AS REPORTED BY RESPONDENTS TO SURVEY

	Within One Year (1978–79)	*Not Now But within Five Years*	*Total Within Five Years*
Potential demand	32	52	84
Potential supply	12	10	22
Excess of demand over supply	20	42	62

The shortage of financial resources can be alleviated through a re-ordering of priorities and, it is to be hoped, increased funding. The shortage of faculty can be addressed by those institutions with doctoral programs in accounting and by additional training of faculty members who might be interested in a change in emphasis.

RESULTS OF THE SURVEY—PART II

Table 8 reflects the average percentage of class time spent on various public sector topics by the institutions returning the second part of the questionnaire. Perhaps reflecting the content of the major textbooks, the majority of time is spent on accounting for state and local

TABLE 8
ELECTIVE GOVERNMENTAL COURSE AVERAGE TIME SPENT IN SUBJECT AREAS
($N=52$)

Subject	*Percentage Time Spent*
State and Local Government	54.6
Budgeting	9.6
Federal Government	8.9
Hospitals	6.4
Colleges and Universities	5.2
Cost Determination	4.6
Auditing	3.4
Public Schools	3.1
Voluntary Health & Welfare Organizations	1.7
Cash Management	1.6
Other	.9
	100.0

governmental units, with the remaining time spread among many topics.

Required course materials included most often were (in alphabetical order) the AICPA Audit Guides for Colleges and Universities [AICPA, 1973], Health and Welfare Organizations [AICPA, 1974], Hospitals [AICPA, 1972], and State and Local Governmental Units [AICPA, 1974], and books by Anthony and Herzlinger [1975], Gross [1974], Hay and Mikesell [1974], Henke [1977], Lynn and Freeman [1974], Lynn and Thompson [1974], and Vargo [1977]. In addition, examination of the course syllabi reflected a wide variety of required and recommended readings, including zero-base and other rational approaches to budgeting, CPA firm recommendations for public sector accounting, AAA committee reports, program evaluation, NCGA materials, GAO materials, and city financial reports. A total of 160 books, pamphlets, and articles were listed as primary or secondary materials.

While a number of courses basically follow the outline of the major textbooks, others approach topics by combining readings with, or as a substitute for, text materials. Some use a management control perspective; some deal with accounting and reporting issues; and others require students to analyze and report on actual financial statements.

In response to an open-ended question, some public sector accounting instructors suggested that a course should not just cover the debits and credits but analyze the current issues in the field. An understanding of the political process, the problems of preparing budgets, and a study of actual agencies or other governments were also suggested as topics.

In general, it appears that public sector accounting instructors feel less constrained by text materials than is true for courses such as Intermediate and Cost Accounting. Perhaps it is necessary to provide public sector background material that is not available in other ways to business students.

CONCLUSIONS

It is likely that the recognized need for accounting graduates with some knowledge in public sector accounting will increase, possibly very quickly. Accountants are hired by all levels of government, by hospitals, colleges, public school systems, and other not-for-profit organizations. CPA firms audit these organizations on a regular basis. Unless the accounting profession is to be content with in-house training, accounting educators must modify curricula to recognize that accounting also serves the public sector.

The results of this survey are limited to the 122 AACSB-accredited institutions that provided responses. It is conceivable that the conditions reported would not generalize to all accounting education institutions. However, since late respondents indicated more of a desire to add public sector courses, currently offer fewer courses and have fewer qualified faculty members, the unmet demand for faculty might be even greater than reported. In addition, the many accounting programs in non-AACSB-accredited institutions would probably represent far more demand for qualified faculty than supply of qualified doctoral candidates.

This survey indicates that leaders of accounting programs recognize this need and desire to expand public sector offerings. Before this expansion can take place, it will be necessary to expand the supply of faculty members who are qualified and interested in the subject areas. Doctoral candidates who choose this expanding specialty should find a ready market for their talents.

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Systematic Evaluations of Tax Accounting Textbooks

Jerome S. Horvitz and Herbert L. Jensen

ABSTRACT: The objective of this paper is to utilize a taxonomy of cognitive skills to evaluate the comparative merits of textbooks on tax accounting presently used in the undergraduate curriculum. The taxonomy has been developed by a group of educational psychologists and can be expressed as a set of educationally useful objectives for student behavior. Because of its structure, the taxonomy of cognitive skills provides an appropriate explicit criterion for a comparative evaluation of tax texts. This approach to evaluation is illustrated using the opinions of a sample of tax instructors.

THE typical tax accounting course often seems to be an adjunct to the main thrust of the accounting curriculum. It is the function of this course to instruct the accounting student in considerable detail about the terminology, rules, procedures, techniques, and concepts of the current federal income tax law. When a second tax course is available, the foundation imbued by the first course can be employed to evaluate more complex tax practices and to provide an insight into the modes of future developments. The subject matter of tax accounting is extremely dynamic, with Congress, the courts, and the Internal Revenue Service modifying the law on a regular basis. The subject matter is also renowned for its complex structure which presents a formidable challenge to the textbook author. The purpose of this paper is to test how well this challenge has been met.

TAX EDUCATION

The traditional setting of tax education has been tripartite. Formal offerings in federal income taxation are found in most accounting and law curricula. Tax institutes, professional development programs, IRS training programs, and in-house training courses provide classes outside the classroom for active professionals. Work with clients in some representative capacity provides another form of practical pedagogy beyond university walls.

These traditional tracks have been developed to accommodate the perceived interests of their participants. Each track, in and of itself, is insufficient for bridging the different disciplines needed for a thorough understanding of the tax law's content. Only when tax education is defined as an interdisciplinary subject encompassing law, economics, accounting, and political science can any one track provide an adequate background by itself [Sommerfeld, 1975]. This framework is illustrated in Figure 1.

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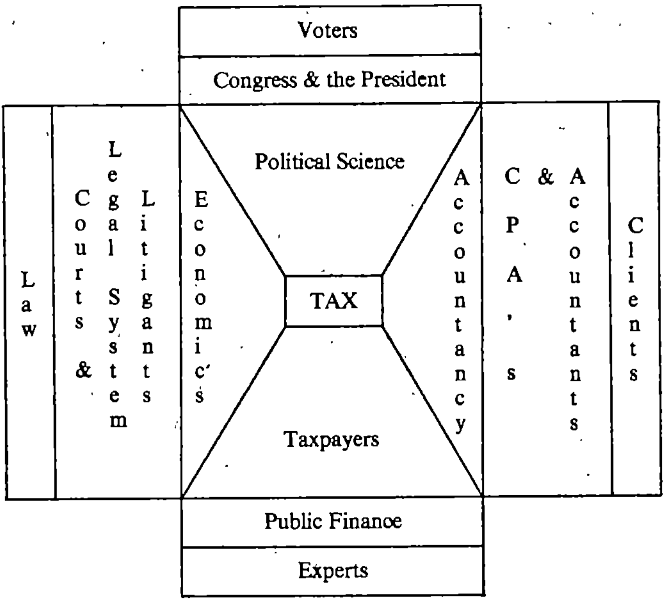
FIGURE 1



Given the interdisciplinary mix illustrated and the varied publics served by the practitioners in those fields, an educational pattern for optimizing tax practice preparation may be suggested:

1. Accounting courses that include a study of financial management, managerial accounting concepts, and auditing.
2. Legal research and the sources of tax research, property law, business law of corporations, partnerships and agencies, securities law, and conflict of laws.
3. Macro- and micro-economic theory, public finance, and an introduction to econometrics.
4. Public administration, legislative process, and analysis of political parties.
5. Taxpayer compliance by way of IRS and judicial procedure, substantive rules applicable to selected areas—such as individual, corporate, partnership, trusts, and estates.

The typical track of formal course offerings attempts to incorporate these facets of optimal tax education into an undergraduate curriculum usually consisting of no more than two tax courses [Williams, 1975, p. 98]. The first course is a comprehensive study of individual taxation. This course normally begins with the concept of gross income, the adjustments made in arriving at adjusted gross income, and the non-business deductions allowed in arriving at taxable income (which also includes the dependency exemptions available). Other areas usually included are property transactions, depreciation methods, and depreciation recapture. If time allows, the study of tax credits will normally end this course.

The second course typically covers corporate taxation, taxation of partnerships, and possibly trusts and estates. Consequently, one can readily see that the customary undergraduate study of taxation is critical in establishing a foundation for more advanced courses specializing in the substantive areas surveyed by the undergraduate tax curriculum. Normally, juniors and seniors enroll in these courses and, thus, it is assumed that their cognitive skills have been developed to a significant extent.

Taxonomy of Cognitive Skills

The taxonomy of educational objectives used in this article is based on research in educational psychology by Bloom [1956] and synthesized by Gronlund [1978, p. 28]. It provides a classification scheme analogous to that used for identifying plants and animals in biology. The categories of cognitive skills are arranged in an ascending hierarchy starting with simple knowledge outcomes and proceeding through the increasingly more evolved levels of comprehension, application, analysis, synthesis, and evaluation. Behavioral skills of the lower levels are assumed to be assimilated into the higher-order capabilities. Thus, ability to comprehend subsumes factual knowledge.

The cognitive domain in general encompasses intellectual outcomes such as knowledge, understanding, and thinking traits. Table 1 provides a brief outline of the major categories. This structure is relevant to textbook evaluation, because it reveals the elements of learning, orders them by proper pedagogical priority, and explicates their continuity.

This taxonomy of acquirable intellec-

Table 1

Major Categories in the Cognitive Domain of the Taxonomy of Educational Objectives*

Description of the Major Categories in the Cognitive Domain
1. *Knowledge.* Knowledge is defined as the remembering of previously learned material. This may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required is the bringing to mind of the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain.
2. *Comprehension.* Comprehension is defined as the ability to grasp the meaning of material. This may be shown by translating material from one form to another (words to numbers), by interpreting material (explaining or summarizing), and by estimating future trends (predicting consequences or effects). These learning outcomes go one step beyond the simple remembering of material, and represent the lowest level of understanding.
3. *Application.* Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories. Learning outcomes in this area require a higher level of understanding than those under comprehension.
4. *Analysis.* Analysis refers to the ability to break down material into its component parts so that its organizational structure may be understood. This may include the identification of the parts, analysis of the relationships between parts, and recognition of the organizational principles involved. Learning outcomes here represent a higher intellectual level than comprehension and application because they require an understanding of both the content and the structural form of the material.
5. *Synthesis.* Synthesis refers to the ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviors, with major emphasis on the formulation of *new* patterns or structures.
6. *Evaluation.* Evaluation is concerned with the ability to judge the value of material (statement, novel, poem, research report) for a given purpose. The judgments are to be based on definite criteria. These may be internal criteria (organization) or external criteria (relevance to the purpose) and the student may determine the criteria or be given them. Learning outcomes in this area are highest in the cognitive heirarchy because they contain elements of all of the other categories, plus conscious value judgements based on clearly defined criteria.

* Source: Gronlund [1978, Table 2, p. 28]; reprinted by permission of the publisher.

tual skills may be restated in terms of the five-item interdisciplinary approach to optimal tax education in order to generate normative criteria for comparatively judging the texts most commonly used in an undergraduate tax course. Although the choice of a criterion and its interpretation in a tax context are subjective, the emergent evaluative tool can be objectively applied to the task of rating the books by the degree to which they individually meet an optimal educational objective. As amended for application to the undergraduate tax curriculum, the taxonomy of cognitive skills can be described as follows:

1. *Knowledge*. Does the text describe the substantive provisions of the Internal Revenue Code (Code) in a manner that will allow the student to recall the rules when applying them to a particular fact pattern?
2. *Comprehension*. Does the text provide a medium for the student to understand the complicated Code provisions? Has the text deleted any important substantive areas?
3. *Application*. Does the text provide for exercises so that the student can use the substantive Code provisions in specific situations? What kind of problems are illustrated?
4. *Analysis*. Does the text break down the subject matter in a logical manner and are Code sections discussed in a fashion that separates the relevant issues from the irrelevant in identifying the substantive problem?
5. *Synthesis*. Does the text draw on the disciplines of law, accounting, economics, and government, as discussed above, in communicating the substantive rules of the Code to the student?
6. *Evaluation*. Does the text make judgments in regard to the value of a particular position taken in relation to a substantive area of the Code?

TABLE 2

ALLOCATIONS OF SKILL CONTENT WITHIN CURRICULUM
(Deakin *et al.*, 1974)

Skill/Level	*Introductory*	*Intermediate*	*Advanced*
Knowledge	35%	10%	5%
Comprehension	30	15	5
Application	20	25	5
Analysis	5	25	20
Synthesis	5	15	30
Evaluation	5	10	35
	100%	100%	100%

EVALUATION SCHEME

Deakin *et al.* [1974] have proposed that equal weight should be given to the six categories of cognitive skills in the structuring of the undergraduate financial accounting program. [See also Adler and Green, 1977.] As shown in Table 2, they divide that portion of the accounting curriculum into three levels—introductory, intermediate, and advanced. The matrix then relates course levels with cognitive skills. The numbers within the matrix represent an arbitrary assignment of emphasis within the system needed to acquire the various skills at various levels. Since lower-order skills must be mastered prior to the development of other abilities, greater weight is given to the knowledge, comprehension, and application cells at the introductory level.

In order to develop a similar tableau for the tax accounting curriculum, over 40 attendees at a concurrent session on tax accounting topics at the 1978 Annual AAA Convention were polled by written questionnaire for their subjective feelings on the appropriate weightings. As shown in Table 3, the respondents were asked to indicate weightings for both a funda-

TABLE 3

ALLOCATION OF SKILL CONTENT
WITHIN TAX CURRICULUM

Skill/Level	*Fundamental**	*Conceptual***
Knowledge	34%	18%
Comprehension	21	13
Application	20	16
Analysis	12	19
Synthesis	8	18
Evaluation	6	17
	101%***	101%***

* 38 Respondents.
** 35 Respondents.
*** Discrepancy of 1% due to rounding.

Definition of a fundamentalist approach:
Utilizing the rules and regulations promulgated by the Internal Revenue Code in order to foster taxpayer compliance.

Definition of a conceptual approach:
An interdisciplinary approach to understanding the Internal Revenue Code and how it fosters tax minimization behavior in light of the Treasury's objective of revenue collection.

mental and a conceptual approach to teaching tax accounting. The definitions of these two approaches are provided in Table 3.

While it is not a random survey, the respondents do represent a purposive sample [Selltiz *et al.*, 1959, pp. 55–56]. The basic assumption underlying this type of sampling is that with sound judgment the people to be included in the sample may be handpicked instead of randomly selected, and the purposive sample will still be satisfactory relative to one's needs.

The purpose of this paper is to describe a useful methodology for comparative evaluations of tax textbooks. Since this methodology is recommended for use by individual professors, the only requirements placed on the sample used here were that it generate numbers suitable for illustrating the methodology and that it be composed of individuals familiar with tax textbooks. The sample drawn from the 1978 Annual AAA Convention met these requirements. The average scores presented in Table 3 indicate that heavier weightings were assigned by the respondents to the skills of knowledge, comprehension, and application for a tax course oriented towards fundamentals than for a tax course oriented towards concepts.

The next step in evaluating a collection of textbooks is to assign each a numerical grade on some arbitrary scale for each cognitive skill level. A weighted average for each book can then be computed using the appropriate weights from an allocation procedure such as that shown in Table 3. This process provides an ordinal ranking of the books according to their suitability for an individual tax course.

The attendees used as a sample at the 1978 AAA Convention were asked to use numerical grades from five (high) to one (low) for this task. For each of the following textbooks, the members of the sample assigned a grade for each of the cognitive skill levels:

An Introduction to Taxation, Sommerfeld, R. M., H. M. Anderson, and H. R. Brock (Harcourt Brace Jovanovich, 1978).

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West's Federal Taxation, Vol. 1 and Vol. 2, Phillips, L. C. and W. H. Hoff-

TABLE 4

TEXTBOOK RATINGS FOR INTRODUCTORY TAXATION

							Weighted Total Score	
Textbook	*Knowledge*	*Comprehension*	*Application*	*Analysis*	*Synthesis*	*Evaluation*	*Fundamental*	*Conceptual*
A ($N=14$)	3.29	3.57	3.36	3.21	3.14	2.86	3.33	3.24
B ($N=20$)	3.40	3.20	3.00	2.85	2.20	2.15	3.06	2.80
C ($N=33$)	3.91	2.94	3.06	2.18	1.70	1.73	3.05	2.59
D ($N=29$)	3.79	3.07	2.86	2.17	1.72	1.79	3.00	2.57
E ($N=20$)	2.70	2.70	2.70	2.80	3.05	3.25	2.78	2.58
F ($N=10$)	2.40	2.50	2.50	2.50	2.30	2.30	2.45	2.43

Scale: 1. Inadequate
2. Barely Adequate
3. Adequate
4. More than Adequate
5. Overly Adequate

TABLE 5

TEXTBOOK RATINGS FOR ADVANCED TAXATION

							Weighted Total Score	
Textbook	*Knowledge*	*Comprehension*	*Application*	*Analysis*	*Synthesis*	*Evaluation*	*Fundamental*	*Conceptual*
A ($N=16$)	3.31	3.38	3.38	3.06	2.94	3.13	3.21	3.21
C ($N=20$)	3.77	3.08	2.85	2.23	1.72	1.77	3.00	2.57
D ($N=23$)	3.52	3.13	2.83	2.17	1.83	1.87	2.93	2.56

Scale: 1. Inadequate
2. Barely Adequate
3. Adequate
4. More than Adequate
5. Overly Adequate

man, eds. (West Publishing Company, 1977).

The number of respondents providing grades for each textbook varied from a high of 33 to a low of 10. Those who did not rate a specific text(s) in all cases checked the block indicating that they were not familiar with that book. Although several of the participants felt that the time allowed was too brief to assign grades adequately, no questionnaire was returned with only a partial grading for any text.

SAMPLE RATINGS

Summaries of the average grades assigned to each textbook are given in Tables 4 and 5. These grades were multiplied by the weightings shown in Table 3 and then summed for each book to give the weighted scores as shown in the last two columns of Tables 4 and 5. It is these weighted total scores that can be used to rank ordinally a collection of textbooks.

In reporting the results of the survey, it was decided to rank the textbooks without identifying them. This decision was made for several reasons. First, the sample size was small. Second, one of the authors of the present article is a contributing author to one of the texts evaluated. Finally, the purpose of the survey was not to obtain definitive rankings but rather to illustrate the application of the taxonomy of cognitive skills to the evaluation of tax textbooks. Accordingly, we have substituted a code letter for the name of each book and listed them in order of their scores under the "Fundamental" column in Table 4.

In actual application, of course, the textbooks should be evaluated under the allocation system for the skill content of the tax course which a professor constructs for himself. With an ordinal ranking developed in a fashion similar to the approach given above, a systematic summarization of the professor's subjective preferences can be achieved.

In order to use the taxonomy of cognitive skills to evaluate the comparative merits of tax accounting textbooks, the individual teacher needs about 30 minutes to perform the following five steps:

1. Allocate 100 percentage points among the six skill levels of knowledge, comprehension, application, analysis, synthesis, and evaluation, according to one's personal preferences concerning course emphasis.
2. Grade each textbook's perceived strength in each of the six cognitive skill levels, using a scale from 1 to 5.
3. Multiply the grades given in step 2 by the weightings allocated in step 1.
4. Sum the weighted grades for each text.
5. Choose the text with the highest weighted total score, as computed in step 4.

Individual teachers utilizing this methodology can compare the relative merits for their purposes of a number of textbooks. A copy of the questionnaire and more detailed tabulations of the results are available by writing the authors.

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THE ACCOUNTING REVIEW
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FINANCIAL REPORTING

Lee J. Seidler, Editor

Statement of Editorial Policy (Revised)

The July, 1978 Accounting Review included a statement of the editorial policy contemplated for this Financial Reporting section. Subsequent experience with the evaluation of manuscripts received, accepted, and rejected has suggested some modifications to the original statement, which are reflected here.

THE purpose of this department is to encourage research and publication of articles and other commentary primarily devoted to financial accounting and reporting. In recent years, the increasing attention accorded to the enhancement of research methodology has sometimes tended to overshadow analysis and criticism of current financial accounting practices. The principal focus of this section will be on the state of the art in financial accounting and reporting.

There is no desire to specify a model article for this department. However, we believe that articles which involve intensive scrutiny of the financial reporting practices of a particular company or industry (including not-for-profit entities), articles devoted to the issues inherent in the practical application of theoretical concepts, and critical analyses of existing financial accounting standards and reporting requirements will be of greater interest to readers. As in other REVIEW departments, the standards and practices may be those of any country so long as they are of more than provincial interest.

The integration of theory and practice will be given high priority; purely normative or descriptive articles generally will not be acceptable. Virtually all articles should include reference to specific examples taken from current financial statements. However, surveys based on manipulation of computerized data bases will rarely be acceptable.

Conventional documentation requirements and footnote references will aply to all manuscripts. However, authors of materials which refer to financial reporting of specific operations, critically or otherwise, should accord particular attention to the necessity to provide complete and specific citations, including derivations of computations when appropriate.

Note that the intent of the department is to *encourage* research and publication related to financial accounting and reporting in THE ACCOUNTING REVIEW. A separate department permits greater flexibility in the length and nature of the published materials—articles, commentaries, items of particular current interest, comments and replies—but it is not intended to suggest any different standard of editorial quality than that imposed in the main body of the REVIEW.

Manuscripts should be submitted (in three copies) to:

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All manuscripts will be subject to review by the editor of this department and outside readers. Anyone contemplating research or articles which may be appropriate to this department is encouraged to submit brief outlines and descriptions of proposed projects for comment by the departmental editor.

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The Non-Consolidated Finance Company Subsidiary

Martin Benis

ABSTRACT: The Financial Reporting section includes two articles on the same subject: the practice of not consolidating controlled finance subsidiaries. Benis examines the implications of this widespread practice on balance sheets and on the resulting analysis of those balance sheets. Burnett, King and Lembke analyze the wide variation in parent company practices related to the recognition of the income of finance subsidiaries and the impact of such variation on analysis of income statements. Both articles appear particularly relevant in view of recently announced projects to reconsider the propriety of non-consolidation of finance subsidiaries.

CURRENTLY, there is an inconsistency in the application of accounting theory to the financial statements of a group of corporations under the control of a common parent. Under normal circumstances, such statements are consolidated since there is the:

> presumption that consolidated statements are more meaningful than separate statements and that they are usually necessary for a fair presentation when one of the companies in the group directly or indirectly has a controlling financial interest in the other companies [AICPA, 1959, para. 1].

However, accounting theory permits some subsidiaries, such as finance companies, to be excluded from the consolidation; conversely, other subsidiaries, such as leasing companies "whose principal business activity is leasing property or facilities to the parent or other affiliated companies shall be consolidated" [FASB, 1976a, para. 31].

The authority for eliminating finance company subsidiaries from the consolidation is paragraph 3 of Accounting Research Bulletin No. 51 [AICPA]. The rationale for this paragraph is that the operations of a finance company and a non-finance company are so dissimilar that their combined financial statements are not meaningful. Based on this paragraph, most manufacturing and retail companies with finance company subsidiaries exclude such subsidiaries from the consolidation. These subsidiaries are reported under the equity method, thereby suppressing huge amounts of debt and overstating returns on assets of the consolidated group. Failure to consolidate distorts the group's overall capital structure, nature of operations, and sources of funds. Although the operations of a finance subsidiary are not similar to those of a manufacturing or retailing parent, this is not a reason for the non-consolidation by publicly held companies inasmuch as FASB Statement No. 14, "Financial Reporting for Segments

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of a Business Enterprise [FASB, 1976b]," requires business enterprises comprised of heterogeneous units to report relevant financial information of each significant unit.

This article presents reasons for the inclusion of the financial statements of a finance subsidiary in the consolidated statements of a parent. It also compares the effects on the parent's consolidated financial statements of inclusion and exclusion of the subsidiary's financial statements.

CURRENT BUSINESS ENVIRONMENT

Today, consolidated groups consist of heterogeneous units in industries as diverse as electronics, communications, and transportation. In such an environment, it is difficult to justify non-consolidation because of dissimilar operations. ITT, RCA, Gulf & Western, and Loews are well-known conglomerates with subsidiaries in highly diverse industries. Another company, Norton Simon Inc. has subsidiaries in vehicle rental (Avis, Inc.), beverages (Canada Dry Corporation), cosmetics (Max Factor & Co.), fashion (Halston Enterprises, Inc.), food (Hunt-Wesson Foods, Inc.), and packaging (United Can Company). As dissimilar as these companies are, their financial statements are consolidated with those of their parent.

Current practice in Canada differs from that in the United States. The Canadian Institute of Chartered Accountants acknowledges the unity of a parent company and its subsidiaries. It recognizes that the parent-subsidiary combine is a single economic unit in which management of the parent may freely transfer human, financial, and physical resources between companies. Therefore, in 1972, section 3050 was added to the *CICA Handbook*. It stated:

> where a company has one or more subsidiaries, that company's financial statements should be prepared on a consolidated basis except in the rare circumstances where this is not the more informative presentation [CICA, 1972, para. 3050.07].

"Rare circumstances," for purposes of the above, involves regulated industries where there are incompatible accounting practices or restrictions on the interchangeability of resources. It also stated that

> the fact that the nature of the business carried on by a subsidiary differs from that of the parent is not a valid reason for, and should not be used to justify, exclusion of a subsidiary from consolidation [CICA, 1972, para. 3050.10].

Thus, a different industry situation must be accompanied by incompatible accounting practices or restrictions on interchangeability of resources before exclusion from consolidation can be justified.

THE FINANCE COMPANY SUBSIDIARY

A finance company subsidiary's activities consist primarily of financing the sales of its parent and the sales of its parent's dealers. These subsidiaries may be classified as follows:

1. Those which purchase receivables from their parents. Examples are Federated Acceptance Corporation, Genesco Financial Corporation, Macy Credit Corp. and J. C. Penney Financial Corporation, which acquire the customer accounts receivable from their retailing parents. Also included in this category is Fruehauf Finance Company, whose principal business is financing the sales and leases of the trailer products of Fruehauf Corporation.
2. Those which derive most of their

income by providing wholesale financing to and purchasing retail installment sales contracts from franchised dealers of their parent companies. Examples are Ford Motor Credit Co., General Motors Acceptance Corporation, and Allis-Chalmers Credit Corporation.

3. Those which, in addition to providing financing, as described above, provide some financing to entities outside the perimeter of the parents' business. Examples are General Motors Acceptance Corporation, General Electric Credit Corp., and Chrysler Financial Corp.[1]

In each category, the primary asset of the subsidiary is the wholesale and/or retail receivables generated either by the parent company or by the parent company and its dealers.

A finance company subsidiary is an extension of its parent. The parent creates it, owns it, and directly or indirectly manages it. The continued existence and growth of the subsidiary depends upon the continued existence and growth of its parent. Parent company sales provide the means by which the subsidiary survives and grows.

A parent company and/or its dealers sell receivables to the finance company. When the company buys retail paper from the dealer, it provides liquidity for the dealer, makes selling by the dealer easier, and ultimately enhances the selling ability of the parent. It also ensures that the parent does not have to borrow to carry dealer receivables. The finance company stands between the dealer and the parent and between the dealer and the dealer's customers by buying both wholesale and retail paper.

The parent company provides the finance company with equity capital; debt, in some circumstances; and a flow of paper. Some companies—such as John Deere and International Harvester—have combined unsecured lines of bank credit available to either the parent or the unconsolidated finance subsidiary. The compensating balances required for these lines of credit are provided primarily by the parent company. Some companies—such as Borg-Warner, Honeywell, and International Harvester—guarantee part of the indebtedness of their finance subsidiaries. However, most parent companies do not provide such guarantees.

The agreement between the parent and its finance subsidiary recognizes the obligation of the parent to assure a profit for its subsidiary. Thus, while Genesco, Inc. incurred a net loss in 1977, its finance subsidiary reported net income. Many agreements specify a minimum level below which the earnings of the finance company may not go. Thus, Ford Motor Company agrees to pay its finance subsidiary if the subsidiary's net income before income taxes is not at a specified level. Deere & Company and Genesco, Inc. guarantee their finance subsidiaries earnings not less than one and one-half times fixed charges.[2]

Accounting for the Investment in the Finance Company Subsidiary

Some companies, such as Allied Stores Corporation and Sears Roebuck & Co., consolidate their finance company subsidiaries. Most companies, however, report their investment in finance subsidiaries under the equity method. However, there are different methods of reporting the income of these non-consolidated subsidiaries.

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[1] Information on the specific companies was obtained from Form 10-K, Item 1, which describes the nature of the entity's business.

[2] Information was obtained from the notes to the financial statements for the credit companies.

In the financial statements of some companies—for example, Honeywell Inc., Sperry Rand Corporation, and Associated Dry Goods Corporation—the consolidated group reduces its interest expense by the income before income taxes of the subsidiary. It increases its income taxes by the subsidiary's provision for income taxes. The pre-tax income of the subsidiary is composed of interest income minus expenses, primarily interest; therefore, for all practical purposes, the subsidiary's operations are consolidated even though its balance sheet is reported under the equity method.

In the financial statements of other companies—for example, Ford Motor Company, General Motors Corporation, and General Dynamics Corporation—the consolidated group reports the net income of the non-consolidated finance subsidiary as other income. Thus, even where the equity method is used, variations in the method of reporting the investee's net income make it difficult to compare meaningfully operations of companies with non-consolidated finance subsidiaries.

SELECTED FINANCIAL DATA

Ratio analysis is used in the decision-making process in both the equity and credit markets. Frequently used are balance sheet and balance sheet-related relationships—the current ratio, the debt equity ratio, and return on assets.

The accompanying tables present the ratios of 21 companies for 1977 and 1976. The ratios in the non-consolidated (N.C.) columns were computed from information in the financial statements of the parent company and its consolidated subsidiaries. The finance company subsidiary was reported under the equity method. The ratios in the consolidated (C) columns were obtained by combining information in the financial statements of both the consolidated group and the non-consolidated finance subsidiary and making appropriate eliminations.

The current ratio is the standard short-term liquidity measure. The debt-equity ratio indicates the relative importance of the components of a company's capital structure. There are many variations of this ratio; the numerator may include all liabilities or only long-term debt, and the denominator may include only stockholders' equity or stockholders' equity plus all liabilities or stockholders' equity plus long-term debt.[3] For this study, the numerator is long-term debt; the denominator includes long-term debt, deferred income taxes, minority interest, and stockholders' equity.[4] Return on assets is the net income of the entity increased by the interest expense and divided by total assets. The major influence which consolidation has on this ratio is to increase the asset base on which the return is computed.

OBSERVATIONS

For most companies, the current ratios did not vary significantly after consolidation. A reason for this result is that the finance subsidiaries of some parents, *e.g.*, the retailing companies, did not provide an aging of their receivables. In these situations, all receivables were classified as current. In other circumstances, current ratios improved because current receivables were financed by long-term debt. However, in these situations, the debt-equity ratio also increased. For some companies, *e.g.*, Borg-Warner, General Motors, International Harvester, and Deere in 1977, the current ratio declined substantially after consolidation.

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[3] For a discussion of this ratio, see Bernstein [1978, pp. 513–515].

[4] For use of this ratio, see Lasman and Weil [1978].

TABLE 1
RATIOS 1977

	Current		*Debt-Equity*		*Return on Assets*	
Corporation	*N.C.*	*C*	*N.C.*	*C*	*N.C.*	*C*
Allis-Chalmers Corporation	1.51	1.43	19.7	44.1	10.3	6.5
Deere & Company	1.94	1.53	25.6	36.4	9.5	7.6
International Harvester Company	2.22	1.58	33.8	55.7	11.3	6.3
Honeywell Inc.	1.92	2.02	23.7	33.5	7.0	5.9
Sperry Rand Corporation	1.71	1.74	24.2	28.3	8.2	7.3
Westinghouse Electric Corporation	1.30	1.26	16.9	28.9	5.4	4.5
Associated Dry Goods Corporation	2.10	2.24	18.0	24.1	6.9	6.2
Carson Pirie Scott & Company	2.14	2.32	38.7	40.2	7.8	7.6
Federated Department Stores, Inc.	1.80	1.74	18.8	18.8	8.7	8.4
Genesco, Inc.	1.54	1.78	71.9	78.9	*	*
R. H. Macy & Co., Inc.	1.49	1.84	32.5	45.7	9.3	6.9
J. C. Penney Company, Inc.	1.75	1.86	15.4	30.2	9.8	7.3
Borg-Warner Corporation	2.06	1.49	19.0	35.7	8.9	5.6
Ford Motor Company	1.38	1.29	24.2	46.2	9.1	5.8
Fruehauf Corporation	1.84	2.13	37.8	48.3	9.0	6.9
General Motors Corporation	1.92	1.49	12.0	38.9	13.6	7.8
The Signal Companies, Inc.	2.29	2.22	30.2	37.6	7.3	6.1
General Dynamics Corporation	1.72	1.79	22.9	33.1	7.1	6.5
FMC Corporation	1.80	1.79	31.6	33.8	7.6	7.3
The Singer Company	1.64	1.76	47.2	50.8	1.1	0.9
U.S. Industries, Inc.	2.35	2.32	21.8	27.1	7.2	6.5

Source—Information for computing ratios was obtained from each company's annual report and/or Form 10-K.
N.C.—Finance company subsidiary not consolidated with parent company.
C—Finance company subsidiary consolidated with parent company.
*—Company sustained net loss for the year.

For all companies except Federated Department Stores, Inc., the debt-equity ratio increased after consolidation. Federated Accepted Corporation, the finance subsidiary of Federated Department Stores, Inc., has little long-term debt; therefore, consolidation does not affect the debt-equity ratio. However, if the numerator had been "all liabilities" then this ratio would have increased. The decrease in the current ratio from nonconsolidated to consolidated indicates that the credit company is using a relatively large amount of short-term debt to finance its receivables. For some—Allis-Chalmers, International Harvester, J. C. Penney, Borg-Warner, Ford, and General Motors—the increase was substantial both in 1977 and in 1976. Comparisons within groups provide additional information about the financial structures of companies. Thus, in 1977 in the retailing group, Penney had the lowest ratio prior to consolidation and the third lowest after consolidation. In the farm machinery group for both years, Allis-Chalmers and Deere switched rankings after consolidation. In both years, Westinghouse had a lower ratio than Sperry Rand prior to consolidation, however, after consolidation, its ratio was slightly higher.

Since consolidation of the finance subsidiary increases the asset base, the return on assets is always lower after consolidation. Prior to consolidation,

TABLE 2

RATIOS 1976

	Current		Debt-Equity		Return on Assets	
Corporation	*N.C.*	*C*	*N.C.*	*C*	*N.C.*	*C*
Allis-Chalmers Corporation	1.57	1.47	21.7	40.4	8.4	6.4
Deere & Company	2.15	2.08	27.7	39.2	10.3	9.0
International Harvester Company	2.18	1.57	36.4	54.2	11.0	6.7
Honeywell Inc.	2.05	2.51	20.5	33.0	6.3	5.4
Sperry Rand Corporation	1.96	2.07	27.1	30.6	8.5	7.8
Westinghouse Electric Corporation	1.33	1.32	18.8	30.9	5.2	4.4
Associated Dry Goods Corporation	2.37	2.69	17.7	24.2	7.2	6.6
Carson Pirie Scott & Company	2.04	2.24	37.8	39.7	7.5	7.3
Federated Department Stores, Inc.	1.73	1.67	17.6	17.6	8.2	7.8
Genesco, Inc.	2.74	2.34	46.1	52.4	6.9	5.5
R. H. Macy & Co., Inc.	1.38	1.89	33.3	47.4	8.7	6.6
J. C. Penney Company, Inc.	1.84	2.05	15.0	30.3	9.1	6.9
Borg-Warner Corporation	2.16	1.78	22.0	40.9	8.0	5.2
Ford Motor Company	1.37	1.34	25.6	47.1	7.0	4.5
Fruehauf Corporation	2.01	2.31	39.6	49.3	8.6	6.7
General Motors Corporation	1.95	1.53	11.2	36.3	13.0	7.9
The Signal Companies, Inc.	2.51	2.44	30.8	37.4	6.1	5.2
General Dynamics Corporation	1.61	1.67	24.5	35.7	8.0	7.2
FMC Corporation	1.95	2.00	33.2	35.6	6.1	5.9
The Singer Company	1.51	1.66	57.6	60.9	0.8	0.4
U.S. Industries, Inc.	2.37	2.07	25.4	27.0	5.8	5.3

Source—Information for computing ratios was obtained from each company's annual report and/or Form 10K.
N.C.—Finance company subsidiary not consolidated with parent company.
C—Finance company subsidiary consolidated with parent company.

Penney reported the highest return in its group; after consolidation, its return on assets was third highest. There were changes in the farm machinery group also. In 1977, International Harvester had the highest return on assets prior to consolidation and the lowest after consolidation. In the automotive group in 1976, Ford had the next-to-the-lowest return before consolidation and the lowest after; in 1977, Ford was next-to-the highest prior to consolidation but next-to-the-lowest after consolidation.

CONCLUSION

Financial analysts and short-term and long-term credit grantors use ratio analysis in their decision making. This article notes significant changes, generally adverse, in three ratios when the nonconsolidated finance subsidiary is consolidated with its affiliates. Investors and creditors may adjust reported income to provide for consolidation of the finance subsidiary; however, the company itself should consolidate. If:

> [f]inancial reporting should provide information to help present and potential investors and creditors and other users in assessing the amounts, timing, and uncertainty of prospective cash receipts, . . . [FASB, 1978, para. 37]

then financial statements must provide this information. Elimination of a significant subsidiary—the finance company—from consolidation makes assessment of prospective cash receipts difficult.

In December, 1978, the Accounting

Standards Executive Committee of the AICPA requested the FASB to consider the problem of non-consolidation of the finance company subsidiary. In the issues paper to the Standards Board, the accounting standards division concluded that present practice should not remain unchanged. It concluded that Accounting Research Bulletin No. 51 should be interpreted to provide criteria to specify those finance subsidiaries that should be consolidated. However, it did not recommend amending the Bulletin to eliminate the possibility of exclusion of finance subsidiaries from consolidation.

The AICPA committee has recognized the problem; the FASB must now solve it. There can be no justification for not consolidating the finance company subsidiary. It is inseparable from its parent; its conception, its continuation, and its results all depend on the operation of its affiliates. Without sales, there would be no need for a finance company subsidiary. The fact that investors and creditors adjust accounting information should not be an excuse for theoretically unsound accounting practices.

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Equity Method Reporting for Major Finance Company Subsidiaries

Tom Burnett, Thomas E. King and Valdean C. Lembke

THE equity method of accounting for intercorporate investments is required by APB Opinion No. 18 to be used in reporting all investments in (1) unconsolidated subsidiaries, (2) corporate joint ventures, and (3) investees over which the investor is able to exercise significant influence. Under the equity method, the investor company recognizes income from the investee at the time the income is reported by the investee and, at the same time, increases the carrying amount of the investment. Dividends from the investee are treated by the investor as reductions in the carrying amount of the investment.

Both APB Opinion No. 18 [AICPA, 1971a, para. 19] and Interpretation No. 1 of APB Opinion No. 18 [AICPA, 1971b, para. 2] view the equity method as a "one-line consolidation." Under this view, the investor's share of the investee's income (excluding extraordinary items) would be shown as a single item on the investor's income statement, and the investment account would be shown as a single item on the investor's balance sheet. The income recognized by the investor presumably would be based upon the investee's after-tax income. In addition, APB Opinions No. 23 [AICPA, 1972a] and 24 [AICPA, 1972b] require the investor to recognize income tax expense on its investment income. The investor can exclude investment income from its tax expense calculation only if the investee is a subsidiary or a corporate joint venture and there is sufficient evidence that either (1) the undistributed earnings of the investee will be invested by the investee indefinitely, or (2) the earnings will be distributed in a tax-free liquidation.

These requirements suggest that financial statement readers should be able to assume that relatively uniform accounting treatment will be used in reporting comparable intercorporate investments. A review of recent financial statements, however, indicates that substantial diversity exists in the procedures used by companies in reporting income from unconsolidated subsidiaries and seems to indicate a need for clarification of the current reporting standards.

AN EXAMINATION OF FINANCE COMPANY SUBSIDIARIES

Given the diversity of reporting practices with respect to unconsolidated subsidiaries, a study was undertaken to determine if the particular reporting approach used by a company could be related to specific circumstantial vari-

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ables. That is, could the difference in accounting methods be justified by differences in the circumstances surrounding the companies involved? Such an argument often has been advanced as justification for allowing alternative accounting methods [Cadenhead, 1970].

Procedures used by the parent companies in reporting the earnings of the 25 largest captive finance companies were examined in this study. Finance companies were chosen because they represent the type of domestic subsidiary most commonly excluded from consolidation [Dick and Rikert, 1977, p. 34]. The operations of most finance subsidiaries are included in the parent company statements using the equity method. Concentrating on finance subsidiaries provided a relatively large number of non-consolidated subsidiaries in the same general industry, thus eliminating the industry of the subsidiary as a major circumstantial variable affecting the choice of reporting methods for the companies selected. Further, the Accounting Standards Executive Committee of the AICPA currently is considering the matter of reporting for finance company subsidiaries.

A total of six different approaches to reporting the income of the 25 finance subsidiaries were identified. These approaches are characterized as follows:

A. Equity in the net income of a finance company subsidiary is included in revenues in the consolidated income statement.
B. Equity in the net income of a finance company subsidiary is included in "other income" above tax expense in the consolidated income statement.
C. Equity in the net income of a finance company subsidiary is shown separately and below after-tax net income for consolidated continuing operations.
D. Equity in the pre-tax income of a finance company subsidiary is reported in consolidated revenues, with the finance company's tax expense included in consolidated tax expense.
E. Equity in the pre-tax income of a finance company subsidiary is reflected as a reduction in consolidated interest expense, with the finance company's tax expense included in consolidated tax expense.
F. Finance company operations are consolidated, with no separate statement breakdown included in the consolidated presentation.

Method F differs from the other procedures in that it involves full consolidation while the other methods are all variants of the equity method. The major differences between Methods A, B, C, and D involve (1) the place in the parent company income statement where the equity in the finance subsidiary's income is shown, and (2) whether income taxes of the finance subsidiary are reflected in the parent's income tax expense or as part of the equity method income. Method E is an unusual variant of the equity method and involves offsetting the equity method income from the finance subsidiary against the parent's reported interest expense. Such an offsetting, where the amounts involved are significant (as they appear to be for the companies in this study), is not consistent with the procedures outlined previously unless some unusual circumstances are present to justify such an approach.

A HYPOTHETICAL ILLUSTRATION

Table 1 contains a hypothetical illustration of the different approaches found for reporting the income from finance

TABLE 1

ALTERNATIVE METHODS OF REPORTING FOR FINANCE COMPANY SUBSIDIARIES

	Parent (excluding subsidiary)	*Finance Subsidiary*	*Reporting Method*						
			A	*B*	*C*	*D*	*E*	F_1[1]	F_2[2]
a. Sales Revenue	100,000		100,000	100,000	100,000	100,000	100,000	100,000	
b. Finance Revenues		12,000						6,000[1]	112,000[2]
c. Income from Subsidiary			2,080[3]			4,000			
d. Total Revenues	100,000	12,000	102,080	100,000	100,000	104,000	100,000	106,000	112,000
e. Cost of Sales	70,000	—	70,000	70,000	70,000	70,000	70,000	70,000	—[2]
f. Gross Margin	30,000	—	32,080	30,000	30,000	34,000	30,000	36,000	—
g. Selling, Gen. & Admin. Expense	8,000	1,000	8,000	8,000	8,000	8,000	8,000	9,000	9,000
h. Earnings Before Interest & Taxes	22,000	11,000	24,080	22,000	22,000	26,000	22,000	27,000	103,000
i. Interest Expense	6,000	7,000	6,000	6,000	6,000	6,000	2,000[4]	7,000[1,5]	83,000[2,6]
j. Earnings Before Taxes & Other Income	16,000	4,000	18,080	16,000	16,000	20,000	20,000	20,000	20,000
k. Income from Subsidiary				2,080[3]					
l. Income Tax Expense (48%)	7,680	1,920	7,680[7]	7,680[7]	7,680[7]	9,600[8]	9,600[8]	9,600[8]	9,600[8]
m. Income from Subsidiary					2,080[3]				
n. Net Income	8,320	2,080	10,400	10,400	10,400	10,400	10,400	10,400	10,400
Sample Ratios									
Pre-Tax Profit Margin $[(j+k)/d]$	16.0%	33.3%	17.7%	18.1%	16.0%	19.2%	20.0%	18.9%	17.9%
Coverage of Fixed Charges $[h/i]$	3.67	1.57	4.01	3.67	3.67	4.33	11.00	3.86	—
Income Tax Rate $[l/(j+k)]$	48.0%	48.0%	42.5%	42.5%	48.0%	48.0%	48.0%	48.0%	48.0%

[1] Assume that F_1 represents a full consolidation where the parent is a manufacturing or merchandising firm and the subsidiary is a credit firm. Full consolidation might be appropriate if the subsidiary lends only to the parent and to the parent's customers. Thus, assume that the parent's $6,000 of interest expense is reflected in the subsidiary's revenues and would be eliminated in consolidation.

[2] F_2 assumes a full consolidation where both the parent and subsidiary are finance companies and there are no intercompany transactions. Assume that the parent shows no cost of sales (rather than $70,000), but shows interest expense of $76,000 (rather than $6,000).

[3] 4000 × (1 − .48).

[4] Interest expense ($6,000) minus income from the subsidiary ($4,000).

[5] The parent's interest expense is eliminated against the subsidiary's finance revenues. The only interest expense remaining is that of the subsidiary ($7,000).

[6] $76,000 + $7,000.

[7] $16,000 × .48.

[8] $20,000 × .48.

company subsidiaries in parent company or consolidated income statements. The first two columns of the table give separate data for the parent and subsidiary. Columns A through E reflect the use of alternative interpretations of the equity method. Column F_1 reflects the assumption that the subsidiary is fully consolidated with a manufacturing company or merchandising company (*e.g.*, retailer) parent, while Column F_2 reflects full consolidation of the subsidiary with a finance company parent. In each case, for purposes of illustration, it is assumed that the parent and subsidiary file separate tax returns, and there is evidence that the undistributed earnings of the subsidiary will be reinvested by the subsidiary indefinitely (thus avoiding the recognition of additional tax expense on possible distributions by the subsidiary).

While net income is the same under each of the six reporting alternatives, the presentation of the data within the income statement differs under each of the methods. These differences may significantly affect various ratios used in financial statement analysis. Three ratios commonly used in income statement analysis are presented in Table 1 and appear to be sensitive to the method of reporting the results of subsidiary operations. The pre-tax profit margin, for example, varies in the illustration from 16 percent to 20 percent. Similarly, depending on the method used to report the operations of the subsidiary, the coverage of fixed charges in the illustration ranges from a low of 3.67 to a high of 11.0, and the calculated effective tax rate is either 42.5 percent or 48.0 percent. Of course, an actual company's financial statements could be more or less sensitive to the choice of alternatives than in this example, but clearly, under certain conditions, this choice can have a major impact on the statements and related ratios.

Methods A and D increase the parent's revenue and therefore raise the profit margin and debt coverage ratios above those reported on a parent-only basis. By adding investment income to the parent's revenue, Methods A and D reduce the financial analyst's ability to directly compare the historical performance of the parent's primary operations with that of its competitors. Earnings or losses of finance subsidiaries generally must be eliminated in such cases if outside (*i.e.*, non-management) users wish to make accurate comparisons of revenue growth, profit margin history, fixed coverage exposure, and other revenue-based ratios among competing companies. Method A adds the after-tax net income of the subsidiary and, therefore, has a lesser impact on the parent's revenue than Method D, which adds the pre-tax income of the subsidiary. As indicated in Table 1, both methods also result in a higher fixed-charge coverage ratio than is reported under full consolidation in Column F_1. While the pre-tax profit margin under Method A is less than under full consolidation, the margin under Method D is higher than when full consolidation is used.

Use of either Method A or D may be questioned on the grounds of homogeneity of parent-versus-subsidiary operations. Presumably the operations of the finance subsidiary were not consolidated due to a lack of homogeneity of operations, and subsidiary revenues and expenses therefore were not added to the revenues and expenses of the parent in preparing its financial statements. It seems illogical to include a *pro rata* portion of the net income of the subsidiary among the revenues of the parent company.

Methods B and C do not affect the parent's revenue, but do result in differences in certain income statement ratios. Method B normally will result in a higher pre-tax profit margin and lower effective income tax rate than Method C. Method C yields the same ratios as those of the parent-only method, since this approach includes the net earnings of the finance subsidiary below the after-tax income from the parent's principal operations. This method separates the parent's primary business activity (*i.e.*, manufacturing or trade) from its credit function performed by the subsidiary. Thus, the use of Method C should permit more reliable ratio analysis of companies in similar industries where the desired focus is upon the parent's primary activity. In those situations where the parent must accrue tax expense on some portion of the investment income, however, Method C would overstate tax expense from normal operations if the additional tax were included in the balance shown in line (1). The only apparent way to avoid this result would be to deduct the tax applicable to the investment income directly from the amount of investment income reported in line (*m*).

Method E does not affect the parent's reported tax rate so long as the parent and subsidiary have the same marginal rates, as in this example. It does have a dramatic impact on the fixed charges ratio, however, since it materially reduces the reported fixed charges. In the illustration in Table 1, the coverage ratio jumps from 3.67 (parent only) to 11.0 (combined).

All other factors being constant, companies employing Method E will report lower fixed charges (*i.e.*, higher coverage ratios) than competing companies which employ one of the four other nonconsolidated methods (A, B, C, or D) to reflect the operations of their finance subsidiaries.

COMPANY DATA

Table 2 lists the actual finance subsidiaries included in the study and the particular method used to report each company's income. In a few cases the reporting company was not the direct parent of the finance subsidiary, but rather maintained control through several levels of ownership (*e.g.*, the parent's parent).

Three of the 25 companies listed in Table 2 are fully consolidated (Method F). Of the other 22 companies, seven are reported using Method A, four are reported using Method B, five using Method C, three using Method D, and three using Method E.

Table 2 also shows the circumstantial variables studied in relation to the different methods of reporting income. These circumstantial variables are as follows:

1. Whether any type of agreement exists whereby the parent will guarantee or maintain the finance subsidiary's income.
2. The business of the parent and/or reporting company. Both the parent and/or reporting company's Standard Industrial Classification (SIC) and a brief description of the major business are included because the two do not always coincide.
3. The business of the finance subsidiary. Both the subsidiary's SIC and a specific description of the subsidiary's business are included. Given that all of the companies are in the same general type of business, the specific configuration of operations might be thought to provide justification of the different accounting methods.
4. The auditor, in recognition that auditors are often thought to influence the choice of accounting methods.
5. The approximate percentage relationship between the subsidiary's net income and the parent or reporting company's net income, as an indication of the significance of the effect of the subsidiary's results on the parent or reporting company's income statement.

The percentage ownership of the subsidiaries held by the parent had no apparent effect on the choice of methods since all subsidiaries were determined to be wholly-owned.

RESULTS OF STUDY

Only a limited number of relationships between the circumstantial variables presented in Table 2 and the particular approach used to report finance subsidiary earnings were apparent. The two parent companies with operations of a primarily financial nature (*i.e.*, Transamerica and American Express) did consolidate their finance subsidiaries (Method F) rather than use the equity method. Full consolidation normally would be required when all of the consolidation standards set forth in Accounting Research Bulletin No. 51 [AICPA, 1959], including the homogeneity of operations, are met. As expected, the other companies in the study did not consolidate their subsidiaries because of the differences in the nature of parent and subsidiary company operations. The one exception was Sears Roebuck which did consolidate Sears Roebuck Acceptance. In addition to providing financing of consumer credit, the Sears finance subsid-

TABLE 2

SELECTED ATTRIBUTES OF THE 25 LARGEST FINANCE SUBSIDIARIES

Finance Subsidiary[1]	Finance Company Ranking[7]	Reporting Basis	Form of Subsidiary Income Disclosure in Parent's Statements[2]	Income Maintenance Agreement	Parent (or Reporting*) Co.		Finance Subsidiary		Auditor[5]	Finance Co. Percentage of Combined Income[6]
					SIC	Business	SIC[3]	Nature of Business[4]		
General Motors Acceptance	1	Equity	A	No	371	Cars, Trucks	615	C, M	DH&S	8%
Ford Motor Credit	2	Equity	B	Yes	371	Cars, Trucks	615	C, M	C&L	18
Sears Roebuck Acceptance	5	Consol.	F	No	596	General Retail	614	F	TR	12
General Electric Credit	7	Equity	B	No	369	Elec. Appliances & Equip.	614, 615 616, 732	A, H, M	PMM	7
Commercial Credit (Control Data)	8	Equity	C	No	357	Bus. Machines	614	J, M	PMM	88
Chrysler Financial	9	Equity	A	Yes	371	Cars, Trucks	615	C, M	TR	8
Associates Corp. of North America (Gulf & Western*)	10	Equity	D	No	335*	Various*	614	J, M	E&W	14*
AVCO Financial	11	Equity	C	No	372	Aircraft Parts, Various	614	K, M	AY	43
Montgomery Ward Credit	12	Equity	E	No	596	General Retail	614	E	AA	56
International Harvester Credit	14	Equity	C	Yes	371	Trucks, Machinery	615	B	DH&S	4
J. C. Penney Financial	15	Equity	E	Yes	561	General Retail	614	E	PMM	18
ITT Financial (ITT.*)	16	Equity	B	Yes	750 366*	Insurance & Financial Communications*	614	I, M	AA	3*
Transamerica Finance	17	Consol.	F	No	671	General Financial	614	I, K	E&W	23
Westinghouse Credit	18	Equity	A	No	369	Elec. Appliance & Equip.	615	J	PW	7
John Deere Credit	19	Equity	C	Yes	352	Farm Equip.	614	B, G	DH&S	8
Borg-Warner Acceptance	20	Equity	C	No	371	Auto Parts, Indust. Prod.	615	C, K, M	PMM	15
Allis Chalmers Credit	21	Equity	A	No	352	Heavy Equip.	614, 739	A	PW	19
American Express Credit	22	Consol.	F	No	601	General Financial	614	L	AY	7
Fruehauf Credit	25	Equity	A	No	371	Truck Bodies & Trailers	615	G, M	TR	30
Honeywell Finance	27	Equity	E	Yes	381	Scientific Instru. & Mach.	615	A	DH&S	9
Clark Equipment Credit	28	Equity	D	Yes	352	Heavy Equip.	615	B	PW	19
Mack Financial (Signal Companies*)	33	Equity	B	Yes	371 Var.*	Trucks Various*	615	G	DH&S	15*
J. I. Case Credit (Tenneco*)	35	Equity	A	Yes	352 492*	Heavy Equip. Gas, Oil*	614	B	AA	3
McDonnell-Douglas Finance	37	Equity	A	Yes	372	Aircraft, Missiles	614, 615, 739	D	E&W	10
White Motor Credit	42	Equity	D	No	371	Trucks, Farm & Const. Equip.	615	A, E, F	E&W	NM

TABLE 2 (*Continued*)

[1] In parentheses are listed parent company names where they are not obvious, or reporting company names (designated by *) where the reporting company is other than the subsidiary's immediate parent.

[2] A. Equity in net income of finance company subsidiary reported in revenue section of consolidated income statement.
B. Equity in net income of finance company subsidiary included in "other income" above tax expense in consolidated income statment.
C. Equity in net income of finance company subsidiary shown separately and below after-tax net income of consolidated continuing operations.
D. Equity in pre-tax income of finance company subsidiary reported in consolidated revenue, with finance company's tax expense contained in consolidated tax expense.
E. Equity in pre-tax income of finance company subsidiary reflected as a reduction of consolidated interest expense, with finance company's tax expense in consolidated tax expense.
F. Finance company operations consolidated, with no separate statement breakdown in consolidated presentation.

[3] 614 = Personal credit institutions.
615 = Business credit institutions.
616 = Loan correspondents and brokers.
732 = Consumer and commercial credit reporting and collection agencies.
739 = Business services.

[4] A = Financing of parent's sales and/or leases.
B = Financing of parent's and dealers' sales and/or leases.
C = Loans in connection with parent's and dealer's sales; leases and loans to leasing companies.
D = Financing of sales and leases of parent and other manufacturers.
E = Finances customer receivables arising from parent's sales.
F = Provides financing for parent by taking parent's short-term notes; raises money in capital markets and from banks.
G = Finances installment receivables and leases acquired by parent.
H = Financing of dealers' inventories and retail sales by dealers.
I = Consumer and commercial credit.
J = Full range of consumer, wholesale, commercial, and industrial financing.
K = Personal loans.
L = Purchases receivables from American Express Card.
M = Insurance (not necessarily a full range).

[5] The auditor code is as follows:

AA	Arthur Andersen & Co.
AY	Arthur Young & Company
C&L	Coopers & Lybrand
DH&S	Deloitte Haskins & Sells (formerly Haskins & Sells)
E&W	Ernst & Whinney (formerly Ernst & Ernst)
PMM	Peat, Marwick, Mitchell & Co.
PW	Price Waterhouse & Co.
TR	Touche Ross & Co.

[6] These figures are only approximations due to variations between years and, in some cases, losses reported by parent or reporting companies (NM indicates not a meaningful figure due to parent's losses).

In general, the figures are based on averages computed using 1974 through 1976 operating results. In some cases, however, a slightly different time period was used due to difficulties associated with gathering or using the 1974–1976 data. More specific information is available from Thomas E. King, Box 104, Accounting Department, Southern Illinois University, Edwardsville, IL 62026.

[7] The rankings are those issued by the American Banking Association. They include both captive and non-captive finance companies.

iary is responsible for raising other funds for its parent through both the capital markets and banking system. Thus, while the subsidiary is legally separate from the parent, Sears Roebuck and Sears Roebuck Acceptance can be considered a single integrated company from an economic point of view, and consolidation would seem appropriate.

The other two major retail chains included in the study, Montgomery Ward and J. C. Penney, did not consolidate their finance subsidiaries but instead used the unusual approach of offsetting the equity method income from the finance subsidiary against consolidated interest expense (Method E). Both subsidiaries finance receivables arising from parent company sales. Because they provide financing for the parent company only, any subsidiary income accruing to the parent apparently is viewed as a reduction in the cost of financing and is treated as an offset to consolidated interest expense. Thus, while each of the three major retail chain subsidiaries provides similar services for the parent, Sears Roebuck Acceptance is fully consolidated in contrast to the treatment accorded the subsidiaries of Montgomery Ward and J. C. Penney. Given the nature of the intercorporate transactions, the choice between the two treatments (Methods E and F) very likely would have little effect on total revenues reported since most of the subsidiary's revenues would be eliminated in preparing fully consolidated statements. The effect upon individual income statement items and various balance sheet totals, however, will be quite different under the two methods.

One other finance subsidiary included in the study was reported by offsetting its income against consolidated interest expense under Method E (Honeywell Finance). It, too, provides financing for various forms of sales and leasing agreements entered into by the parent. Again, the view apparently is taken that any income of the finance subsidiary is a reduction in the overall cost of debt financing of the parent company.

In all four cases where a non-finance parent either fully consolidated its subsidiary or reflected the subsidiary's pre-tax income as an offset to interest expense, the subsidiary was primarily involved in financing operations for the parent only. While consolidation seems appropriate from an economic point of view, the question of whether the offsetting approach provides more or less information to financial statement users is open to conjecture. Use of a method other than those set forth in the authoritative pronouncements, however, clearly makes comparisons difficult, particularly when the method used is unusual and its use is not justified nor the reason for departing from authoritative pronouncements explained.

At least with respect to the effect upon the income statement, this offsetting approach seems to fall somewhere between the equity method "one-line consolidation" approach and full consolidation. The effect of using Method E is particularly important because of the dramatic impact it has on the calculated coverage of fixed charges. Unfortunately, comparability is even further hampered because not all companies with finance subsidiaries involved solely in financing the parent's operations use Method E or F in their reports (*e.g.*, Allis Chalmers, White Motor).

An examination of reporting methods used by the other companies included in Table 2 and their circumstantial variables reveals no particular association between the reporting method and the variables listed. Companies that appear to be otherwise comparable have elected to use different methods of reporting subsidiary income, while the same reporting method is used by companies that differ considerably in their circumstances. Thus, it appears that the particular method chosen for reporting the results of subsidiary operations in the parent company or consolidated financial statements, at least for the companies in this study, is more a function of management's preference (and perhaps a lack of clarity of the authoritative pronouncements) than of the surrounding circumstances or nature of the company. While management may be well-intentioned in its choice of reporting methods, financial statement analysis is certainly made more difficult because the companies do not explain the reasons for their choice of methods, nor do they provide the information necessary to convert from one method to another. This, of course, is not a problem restricted to reporting for finance company subsidiaries alone.

SUMMARY

A number of different approaches are being used in reporting investment income from non-consolidated finance subsidiaries. Although finance subsidiaries tend to be fully consolidated when the parent is also a finance company, one non-finance parent in the study also consolidated its finance subsidiary. Of the various methods used in applying the equity method, only Method E (offsetting against interest expense) appears to be related to the circumstantial variables examined. This approach seems to be a novel substitute for consolidation. While other circumstantial variables might be examined, there is nothing to suggest additional variables that might have more explanatory power.

In summary, the study indicates that the particular approach to reporting the operations of finance company subsidiaries under the equity method is related to the economic circumstances of the parent and subsidiary in only a few cases. In most other cases, there seems to be little justification for the specific equity-method approach (as distinguished from the equity method in general) used by the companies in the study.

This diversity of reporting practices makes financial statement analysis and comparisons between companies much more difficult, especially since the financial statements contain little to clarify the underlying rationale for the procedures used. If a reduction in the number of reporting alternatives is of concern to the Financial Accounting Standards Board or other authoritative bodies, further clarification of the appropriate approach to reporting under the equity method appears to be in order.

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Postscript

Follow-up note to "Current Value Reporting of Real Estate Companies and a Possible Example of Market Inefficiency" (Dan Palmon and Lee J. Seidler; *The Accounting Review*, July 1978).

It will be recalled that the article described an unusual increase in the price of the shares of Monumental Corporation after an announcement that the real estate properties of the company would be sold: from $15\frac{5}{8}$ to 18 and to 22 by the end of 1977. With the announcement of a favorable tax ruling, the price increased to 24.

By mid-1978, the price rose to $27\frac{3}{4}$. In August, as originally announced, the company split into two entities. For each share of Monumental Corporation stock, holders received .52 shares of a new Monumental Property Trust and .48 shares of a new Monumental Corp. stock, representing the insurance portion of the original company. Prices at August 10, 1978, the first day on which both the new Monumental Corporation and Monumental Property Trust were quoted, were 20 and $38\frac{1}{2}$, respectively, equal to a selling price for each old share of $29\frac{5}{8}$ ((20 × .48) + (38.5 × .52)). On December 31, 1978, the new shares closed at $21\frac{3}{4}$ and $50\frac{1}{4}$, respectively, equivalent to a $36\frac{1}{2}$ price for the old shares. On February 21, 1979, Property Trust shares were 54 and Monumental Corporation shares were $31\frac{3}{4}$ (*i.e.*, 43 in terms of the old shares). There were no significant changes in the properties owned by the real estate trust during this period. The increase in the Monumental Corporation insurance company stock is apparently unrelated to the increase in Monumental Property Trust. It appears to have been the result of improved results and rumors of an impending takeover.

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Comments

General-Price-Level-Adjusted Historical-Cost Statements and the Ratio-Scale View: A Comment

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THIS paper is a comment on Vickrey [1976] The purpose of Vickrey's article was "to appraise the validity of the ratio-scale view" [p. 32] in order to determine whether the numerical assignments in accounting conform to the requirements of measurement theory and to evaluate the relevance of these numerical values to the construction and the confirmation of accounting theory [p. 31]. Using the tenets of the theory of fundamental measurement, Vickrey concluded that the ratio-scale view was invalid because of the object, property, operations, and index difficulties [p. 33]. The purpose of this comment is to point out weaknesses in Vickrey's analysis which suggest that his conclusion about the ratio-scale view is unjustified.

A QUESTIONABLE POINT OF DEPARTURE

Vickrey's analysis of the ratio-scale view begins with the following assertion:

> According to the theory of fundamental measurement, the phenomena subjected to measurement using extensive ratio scales are objects, i.e., phenomena which have physical form and which possess various properties [p. 34].

That assertion combines Campbell's theory of fundamental measurement with Stevens's theory of scales in a way that gives the impression that there exists a cohesive theory of fundamental measurement via extensive ratio scales. The use of the terms "fundamental" and "extensive" suggests the classical view which restricts measurement to the extensive properties of physical objects. The use of the term "ratio scale" suggests the modern view which expanded the concept of measurement to include the assignment of numerals to physical, psychophysical, and psychological or intensive magnitudes. There is a documented theory of fundamental measurement and there is a documented theory of ratio scales [see Abdel-Magid, 1979]. It is also true that fundamental measurements of extensive properties satisfy the tenets of the theory of ratio scales. But ratio scales and extensive ratio scales are not one and the same thing. As Stevens [1946, p. 680] points out, "the so-called fundamental scales are important instances of ratio scales, but they are only

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instances." The theory of ratio scales views fundamental measurement as a kind of operation and not a kind of scale [Stevens, 1959, p. 23].

Thus, a major dilemma in Vickrey's article is found in his use of a criterion incompatible with the subject of his analysis. The criterion is said to be "the theory of fundamental measurement via extensive ratio scales." The subject of the analysis is the ratio-scale view in accounting. Instead of using Stevens's theory of ratio scales [1946, 1951, 1959, 1975], Vickrey relied for his evaluation on the tenets of the theory of fundamental measurement. This definition of the criterion led Vickrey to the erroneous conclusion that the ratio scale view in accounting is invalid.

DESCRIPTION OF THE RATIO-SCALE VIEW

Consider the following assertion:

> Theoreticians who hold the ratio scale view maintain that general-price-level-adjusted historical cost statements are produced via extensive ratio scales and related positive similarity transformations [p. 32].

Those theoreticians include Moonitz [1970], Mattessich [1964], and Lim [1966]. The views of those theoreticians have been misstated on two important issues. First, it is asserted that those writers hold the ratio scale view to justify general-price-level-adjusted historical cost statements. At issue here is whether the need for a stable unit of measurement is unique to the historical cost model or common to all accounting models. Second, it is asserted that those writers mean extensive ratio scales when they write about ratio scales. At issue here is whether supporters of the ratio-scale view adhere to classical or modern measurement theory in their analysis of accounting measurements.

On the first issue, Moonitz [1970, p. 471] says:

> From the standpoint of measurement theory, the need for a uniform scale would seem to be paramount, since it is always required for valid comparisons, whether the data to be compared are on a historical basis, a projected basis, or a current market-price basis.

Mattessich [1964, pp. 73–75] illustration of a ratio scale in accounting used different monetary scales (scales of different currencies) without making any reference to historical cost statements, and on page 75 he refers to the use of the ratio scale in the measurement of values. Lim [1966, p. 642] says that "the common dollar controversy centers about the problem concerning the propriety of calculations under various valuation procedures." The purpose of his article was not to determine the most useful valuation technique, but to provide a critical examination of the mathematical propriety of accounting measurements and calculations [Lim, 1966, p. 650].

On the second issue, all the theoreticians just mentioned used the term ratio scale and referred to similarity transformations, but none of them used the term extensive ratio scales or identified ratio scales with the theory of fundamental measurements. In his discussion of measurement in accounting, Mattessich [1964, p. 80] describes fundamental measurement as of little relevance to accounting problems and says [1964, p. 79] that "there neither exists at present the possibility to infer accounting values through 'natural laws' (*i.e.*, by fundamental measurement) nor through a combination of two or more fundamental measures that results in derived measurement." Furthermore, Mattessich [1964, pp. 63–77] demonstrated the relevance and applicability of Stevens' four scales to accounting. Lim [1966, p. 643] began his analysis with the following statement:

> The following summary is intended to demonstrate that scales of measurement deter-

> mined by Stevens provide the basis and mathematical propriety of accounting measurements.

Moonitz [1970, p. 465] used the phrase "scales of measurement," but his discussion made no reference to extensive ratio scales or to fundamental measurements.

ANALYSIS OF THE OBJECT DIFFICULTY

There are fallacies in Vickrey's analysis of the object difficulty [p. 34]: (1) the assertion that the seven classes of assets and liabilities may be placed in mutually exclusive classes [p. 34] ignores the role of functional definitions in measurement, and (2) the assertion that cash is a physical object while claims and promises are not [p. 34] is inconsistent with an important principle of economic theory.

There are certain important characteristics of functional definitions: (1) objects with totally different structural properties may produce objects with common functional properties, (2) structural objects require an environment to produce functional properties (for example, tables are useful for writing and eating only if people use them), and (3) functional definitions consist of specification of common properties [Churchman, 1961, p. 98]. Those characteristics reveal a major weakness in Vickery's analysis of the object difficulty. Specifically, the assertion that claims, rights, promises, and future economic benefits (classes 2 through 7 on p. 34) are not objects ignores the role of functional definitions in measurement. The ability to define objects in terms of essential properties presupposes a criterion of relevance. Cash, land, equipment, and claims and rights have different structural properties (claims and rights are usually supported by documents), but from a functional point of view they all produce the common property of economic benefits when used in the ordinary operations of the firm. The various classes of assets and liabilities may possess totally different structural properties and still produce the common property of economic benefits. The assertion also fails to recognize the close relationship between the process of defining objects and the general purpose of measurement. It is widely accepted that the general purpose of measurement is to make comparisons of the relevant properties of different objects [Ackoff, 1962, p. 179; Churchman, 1961, p. 114; Sterling, 1970, p. 72]. Measurements can provide meaningful comparisons only when different objects are defined in terms of a common property. This makes functional definitions more relevant to measurement than structural definitions.

The assertion that cash is an object while claims to monetary units, *e.g.*, accounts and notes receivable, are not fails to recognize that the basic nature of money is its general acceptability by all members of society and not its physical attribute. Stonier and Hague [1957, p. 363] describe the nature of money as follows:

> It is not necessary to be an anthropologist to see that it is society and not any physical characteristic which decides which goods shall and which shall not be money. There is no common physical characteristic of coins, bank notes, and bank balances. Indeed, bank balance, which is so vital a kind of money in modern society, has scarcely any physical constitution at all. Bank balances amount to no more than marks in ledgers.

LOGICAL VIOLATIONS IN THE ANALYSIS OF THE PROPERTY DIFFICULTY

Vickrey's analysis of the first aspect of the property difficulty [p. 35] seems to suggest that the ratio-scale view will be correct only if it involves the measurement of a well-defined extensive property. The requirement of an extensive property is implicit in an argument which links the theory of fundamental measurement to ratio scales through an assertion that does not involve a logical relation between fundamental measurement and ratio scales. Vickrey [p. 35] first concludes that the property to be measured using historical cost techniques has not been identified. Then, in the analysis of the second aspect of the property difficulty, Vickrey [p. 34] assumes that the property to be measured is service potential (an intensive property). Based on that argument, he concludes [pp. 33, 36] that liabilities cannot be considered to possess service potential, and therefore, the ratio-scale view is invalid. But in the description of the index difficulty the author [p. 33] says that historical cost values "may be best interpreted as measures of numerosity."

The validity of a logical conclusion depends on the consistency and stability of the arguments supporting that conclusion. A careful look at Vickrey's argument reveals violations of some rules of theoretical inquiry. In the first aspect of the property difficulty, the reader is told that the ratio scale view will be correct only if the property to be measured is an extensive property. But in the second aspect of the property difficulty the author changes the rule and assumes that the property is service potential (an intensive property) in order to prove that liabilities do not have the required property. This change of rule is a violation of a basic rule of the logic of theoretical science, *e.g.*, stability. Stability means that the investigator should not use an old rule in one instance and a new rule in another at his convenience [Margenau, 1950, pp. 88–89]. Another logical violation is found in the analysis of the property and index number difficulties. The reader is first told that the property to be measured has not been identified [p. 35]. But in the description of the index number difficulty, it is said that historical-cost values are measures of numerosity [p. 35]. One basic rule of logical argument is that *a* is either *b* or not *b*, but not both. How can one reach a valid conclusion from two internally inconsistent arguments?

ANALYSIS OF THE OPERATION DIFFICULTY

Vickrey [p. 33] asserts that "empirical operations which can be used to show that the phenomena of historical-cost accounting satisfy axioms of extensiveness apparently do not exist."

The problem with this assertion is that the operation required for the validity of the ratio-scale is not empirical but mathematical. The ratio-scale view argues for multiplying accounting figures by a constant to preserve the empirical contents of accounting figures when the price level changes. In other words, the ratio-scale view says that ratio-scales permit mathematical transformation through multiplication by a constant and that such mathematical transformation is a sound basis for price-level accounting. It is possible to argue that the ratio-scale view implicitly assumes that accounting numbers are produced by a ratio-scale and, hence, the empirical operations required for the validity of the ratio-scale are also required for the validity of the ratio-scale view. That would be a valid argument. Nevertheless, the nature of the empirical operation required for the validity of the ratio-scale is fundamentally different from the nature of the operation used by Vickrey to invalidate the ratio-scale view.

Vickrey asserts [p. 37] that the ratio-scale view is invalid because there is no physical operation that can be used to determine order, equality, and additivity. That assertion ignores the nature of empirical operations in modern measurement theory. The key empirical operation in modern measurement theory is the matching of an element of one domain to another element of another domain [Stevens, 1975, p. 46]. The operation of matching can be used to map extensive properties, *e.g.*, numerosity, or intensive properties, *e.g.*, brightness, loudness, utility, *etc.* Subjects can match numbers to sensations in ways that produce ratio-scales [Stevens, 1975, p. 61]. People can match numbers to apparent loudness, or match loudness to the strength of a vibration on the fingertip, or match numbers to prestige of occupations [Stevens, 1975, p. 230]. The empirical operations of matching may vary widely, depending on what is to be measured [Stevens, 1975, p. 47]. Indeed, the particular operations developed stem directly from the definition of the property to be measured [Ghiselli, 1964, pp. 20–23]. In the measurement of sensation, the operations can be verbal responses, dial turnings, key pressings, or painting of grays [Stevens, 1975, p. 51].

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In Defense of GPLAHCSATRSV

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In the context of "General-Price-Level-Adjusted Historical-Cost Statements and the Ratio-Scale View" (GPLAHCSATRSV), the ratio-scale view is the position that general-price-level-adjusted historical-cost statements are produced via the extensive ratio scale and related positive similarity transformations. One of the major conclusions of GPLAHCSATRSV is that this view is very likely to be invalid as a consequence of problems which I termed the objects, property, operations, and index difficulties. Abdel-Magid [1979b] has written a comment on GPLAHCSATRSV (a) that is meant "to point out weaknesses in Vickrey's analysis which suggest that his conclusion about the ratio-scale view is unjustified" and (b) that concludes inconsistently that my conclusion about the ratio-scale view is erroneous. The primary objectives of this article are to demonstrate that Abdel-Magid's commentary fails to accomplish its stated objective, that his conclusion mentioned in (b) above is irrelevant in the context of GPLAHCSATRSV, and that his commentary fails to support this conclusion in purely logical terms. In pursuing these goals, I refer to the paragraphs in Abdel-Magid's commentary by number for ease of exposition and to aid the reader in following my arguments.

Paragraph 2 of Abdel-Magid's commentary emphasizes several themes which permeate his analysis of GPLAHCSATRSV:

(a) The belief that GPLAHCSATRSV is founded on the works of outdated classical measurement theorists and that this paper should have been based on Stevens's modern view of measurement.[1]
(b) The view that GPLAHCSATRSV incorporates some sort of intentional or unintentional fusion of the works of Campbell and Stevens.
(c) The belief that there is no cohesive theory of fundamental measurement which encompasses the extensive ratio-scale.
(d) The notion that the theory of fundamental measurement which is imbedded in GPLAHCSATRSV fails to allow for the measurement of intensive properties via ratio scales (as well as other types of scale).

One problem with theme (a) is that the authors who provide the foundation for the analyses that are contained in GPLAHCSATRSV [Suppes and Zinnes,

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[1] Abdel-Magid emphasizes similar points in his first article. For example, he says [Abdel-Magid, 1979a, paragraph 25], "another fallacy in the *classical* [emphasis mine] analysis of the ratio-scale view is the assertion [Vickrey, 1976, p. 34] that the ratio-scale view will be valid only if the property measured in accounting is an extensive (or physical) property." In this context, note that I claim merely that the extensive-ratio-scale version of the ratio-scale view (see below) will be valid only if the property measured in accounting is an extensive property and that I do not equate the terms "extensive" and "physical."

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1963; Pfanzagl, 1968; and Krantz *et al.*, 1971] (see footnote 2 of GPLAHCSATRSV) all constitute state-of-the-art measurement theorists. Furthermore, Stevens's view of measurement generally is consistent with (although not identical to) the view of measurement that is contained in my cited references. For example, in footnote 2 of GPLAHCSATRSV, I define "fundamental measurement" as

> . . . the assignment of numerals to represent properties of the elements of empirical relational systems . . . on the basis of the isomorphisms and homomorphisms of these systems and subsystems of appropriately chosen full numerical relational systems.

and indicate that this definition is based on the works of the authors which I cite. Similarly, Stevens [1959, p. 20] says:

> Under the *modern view* [emphasis mine] the process of measurement is the process of mapping empirical properties or relations into a formal model. Measurement is possible only because there is a kind of isomorphism between (1) the empirical relations among properties of objects and events and (2) the properties of the formal game in which numerals are the pawns and operations the moves.

Indeed, comments such as those presented above are scattered throughout Stevens's works in general and are contained specifically in the manuscripts of Stevens which are cited by Abdel-Magid (*i.e.*, including the work of Stevens cited above, Stevens [1946, p. 677], Stevens [1951, p. 23], and Stevens [1975, p. 48]). Apparently, Abdel-Magid fails to recognize the consistency between the works of Stevens and the works of the authors that I cite and that all of these authors are modern measurement theorists. In any event, the above comments also imply that theme (b) is invalid. That is, as indicated above, the analyses that are contained in GPLAHCSATRSV are based on the works of the modern measurement theorists which I cite and, consequently, I did not combine Campbell and Stevens's views in any way (intentionally or otherwise).

The difficulty with themes (c) and (d) is that they both are patently false. The interested reader easily can find support for this conclusion throughout the works upon which GPLAHCSATRSV is founded (see especially Suppes and Zinnes [1963, pp. 15–17 and 22–48], Pfanzagl [1968, pp. 31–32], and Krantz *et al.* [1971, pp. 1–12, 31–33, 71–82, and 123–124]).

Abdel-Magid's failure to recognize the above-mentioned "theme-related" points is puzzling, given the existence of footnote 2 of GPLAHCSATRSV. I can only assume that he has overlooked or has ignored this note or has failed to consider the works of the authors which I cite carefully. In regard to these possibilities, note that Abdel-Magid fails to reference any of the manuscripts cited in footnote 2 of GPLAHCSATRSV.

Before commenting on paragraph 3 of Abdel-Magid's criticism of GPLAHCSATRSV, a slight digression is necessary. Specifically, I find it necessary to clarify the rationales for two possible versions of the ratio-scale view in the context of modern measurement theory: (a) the extensive-ratio-scale version (*i.e.*, the view that general-price-level-adjusted historical-cost statements are prepared using extensive-ratio-scales and related positive similarity transformations) and (b) the intensive-ratio-scale version (*i.e.*, the view that the above-mentioned statements are prepared using intensive ratio scales and related positive similarity transformations). Version (a) of the ratio-scale view (*i.e.*, the version that is incorporated in GPLAHCSATRSV) is founded on the following rationale:

(a) Additive properties (*e.g.*, length, mass, *etc.*,) are quite useful in scientific theorizing.
(b) General-price-level-adjusted historical-cost statements are prepared using addition and subtraction and multiplication by positive constants (*i.e.*, see footnote 2 of GPLAHCSATRSV).
(c) The procedures identified in (b) constitute mathematical operations that can be applied to measures of additive properties.
(d) Given (a)–(c), it seems reasonable to consider general-price-level-adjusted historical-cost statements from the perspective of scales which are used in measuring additive properties.
(e) In the theory of fundamental measurement which is imbedded in GPLAHCSATRSV, additive properties constitute extensive properties.
(f) Since extensive properties are measured by a particular type of ratio scale in this theory (*i.e.*, the type of ratio-scale which I refer to as an extensive ratio scale (see footnote 2 of GPLAHCSATRSV), it is appropriate, given (d) and (e), to consider the extensive ratio-scale version of the ratio-scale view.

In contrast, the intensive-ratio-scale version of the ratio-scale view, which is implicit in Abdel-Magid's commentary, appears to be founded on the following rationale:[2]

(a) Accounting direct (*i.e.*, primary) measures may constitute measures of a property (*i.e.*, exchange value or value) which are produced via the intensive ratio scale.
(b) If accounting direct measures do constitute intensive ratio-scale measures, then these measures can be added, subtracted, *etc.*, in accordance with the rules of mathematics given that price indices have been applied as appropriate in allowing for instability of the unit of measure.
(c) The descriptive validity, or empirical import, of the values which result from the processes of calculation mentioned in (b) are irrelevant in regard to scientific theorizing since a theory should be judged primarily on the basis of its predictive or explanatory powers.

My view (contrary to the impression that may be created by both Abdel-Magid [1979a] and [1979b]) is that both of the above rationales are reasonable and, consequently, that both versions of the ratio-scale view are worthy of analytical and empirical inquiry.[3] Indeed, the closing remarks of GPLAHCSATRSV reveal my feelings on the key point in the above rationale (*i.e.*, item (c) above):

> The analysis of the ratio-scale view presented above implies that we have reason to be pessimistic about the relevance of the numerical values contained in GPL statements to the construction and the confirmation of a scientific theory of accounting. Of course, we cannot be certain that these values are irrelevant because the ultimate test of the relevance of these values must necessarily be related to whether they fit into a theory which

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[2] I have summarized this rationale on the basis of Abdel-Magid [1979a, paragraphs 32–41] since Abdel-Magid [1979b] contains no rationale for the intensive-ratio-scale version. Note that this rationale is quite similar to the reasoning that is contained in Lim [1966]. In this context, it is relevant to consider Larson's [1967] comments on Lim's views. Also, see Vickrey [1975, pp. 122–125 and pp. 130–132] for a discussion of Lim's and Larson's comments concerning the intensive ratio-scale version of the ratio-scale view.

[3] Note, however, that I am unaware of any scientific theories which both have significant predictive or explanatory powers and employ simple sums or differences of measures of intensive properties. For this reason, among others, I chose to deal with the extensive-ratio-scale version of the ratio-scale view in GPLAHCSATRSV.

> has significant predictive, explanatory and descriptive powers. . . .

In contrast, paragraph 3 of Abdel-Magid's commentary seems to imply that I should have considered the intensive-ratio-scale version of the ratio-scale view and that the extensive-ratio-scale version of this view is not worthy of consideration (also, see Abdel-Magid, 1979a, paragraphs 5 and 6). If so, then it seems reasonable to argue that Abdel-Magid should have demonstrated that the rationale behind the extensive-ratio-scale version of the ratio-scale view is faulty rather than simply asserting that I have used a criterion that is incompatible with the subject of my analysis, *etc.* My view is that the rationale for the extensive-ratio-scale version of the ratio-scale view stands on firm ground. Also, note, as implied above, that the criteria of my analysis (*i.e.*, the extensive-ratio-scale aspects of the theory of fundamental measurement) actually are perfectly consistent with the subject matter of my analysis (*i.e.*, the extensive-ratio-scale version of the ratio-scale view) despite Abdel-Magid's assertion to the contrary.

Another major problem with paragraph 3 is the conclusion that my conclusion concerning the ratio-scale view is erroneous.[4] The major difficulty with this conclusion is that it ignores the objective of GPLAHCSATRSV (*i.e.*, to reconsider the *extensive*-ratio-scale version of the ratio-scale view). In view of this goal, my conclusion is only that it is highly unlikely (*i.e.*, as opposed to a certainty as Abdel-Magid indicates) that this version of the ratio-scale view is valid and, consequently, that we have reason to be pessimistic about the numerical values contained in general-price-level-adjusted historical-cost statements in regard to the construction and confirmation of a scientific theory of accounting. In contrast, Abdel-Magid's conclusion about my conclusion concerning the ratio-scale view appears to be related to the intensive-ratio-scale version of the ratio-scale view. In other words, Abdel-Magid concludes that my conclusion concerning the intensive-ratio-scale version of the ratio-scale view is erroneous (*i.e.*, even though GPLAHCSATRSV does not consider this version). Support for this perspective is as follows. First, Abdel-Magid's conclusion that my conclusion is erroneous (invalid) implies logically that he believes that some version of the ratio-scale view is valid. In fact, Abdel-Magid appears to argue that the intensive-ratio-scale version of the ratio-scale view is valid [Abdel-Magid, 1979a, paragraphs 34–41] and appears to concede that the extensive-ratio-scale version of this view is invalid [Abdel-Magid, 1979a, paragraph 18]. Thus, his conclusion must be related to the intensive ratio-scale version of the ratio-scale view and, consequently, is totally irrelevant in regard to any aspect of GPLAHCSATRSV.[5] Furthermore, Abdel-Magid's commentary fails even to attempt to support any version of his conclusion in purely logical terms. That is, in order for his commentary to support a given version of this conclusion logically, it would have had to demonstrate that the related version of the ratio-scale view is valid. Since his commentary does not contain such a demonstration, it fails to support his conclusion in purely logical terms.[6]

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[4] Notice that Abdel-Magid's [1979b, paragraph 1] stated goal is to demonstrate *only* that my conclusion concerning the ratio-scale view is unjustified. Thus, his conclusion is inconsistent with his stated objective.

[5] While unlikely, it is possible that Abdel-Magid *meant* to conclude only that my conclusion concerning the ratio-scale view is unjustified (*i.e.*, see footnote 4). Under these conditions, the above argument of irrelevancy still applies if he is referring to the intensive version. On the other hand, if he is referring to the extensive version, then he fails to demonstate that my conclusion is unjustified (*i.e.*, as implied by the remainder of this paper).

The first problem with paragraphs 4–6 of Abdel-Magid's commentary is the view that "it is asserted that those writers hold the ratio-scale view to justify general-price-level-adjusted historical cost statements." The problem with this belief is obvious: I make no such claim. Indeed, Abdel-Magid makes no specific reference to such a claim. Instead, he simply provides the following excerpt which is meant only to define the phrase "ratio-scale view" in the context of GPLAHCSATRSV and to provide part of a transitional link between my reasoning in the prior paragraph of GPLAHCSATRSV and the related excerpt from Moonitz [1970]:[7]

> Theoreticians who hold the ratio-scale view maintain that general-price-level-adjusted historical-cost statements are produced via extensive ratio scales and related positive similarity transformations [pp. 465–466].

Given that I am not guilty of the above-mentioned assertion, it follows that paragraph 5 is irrelevant with respect to GPLAHCSATRSV. Thus, this paragraph is considered no further.

Paragraph 6, on the other hand, requires some analysis. The foundation for Abdel-Magid's sixth paragraph is the apparent belief that I feel that Moonitz, Mattessich, and Lim all hold (or held) the extensive ratio-scale version of the ratio-scale view and that my feeling is incorrect. On this matter, I freely admit that my feeling is that Moonitz held this version of the ratio-scale view when "Price-Level Accounting and Scales of Measurement" was written. While I may be wrong in this inference, it seems somewhat unlikely that Moonitz had any other type of ratio scale in mind when he considered the similarity between price-level-adjustment procedures and the admissible transformation which is related to the *extensive* ratio scales that are employed in measuring length (*i.e.*, see Moonitz [1970, pp. 465–466] and the related quotation on pp. 32–33 of GPLAHCSATRSV). Abdel-Magid's only comment concerning Moonitz's belief on this subject is "Moonitz . . . used the phrase 'scales of measurement,' but his discussion made no reference to extensive ratio scales or to fundamental measurements." This comment seems quite inadequate to establish that Moonitz did not hold the extensive-ratio-scale version of the ratio-scale view when "Price-Level Accounting and Scales of Measurement" was written (especially given Moonitz's reference to the extensive ratio scales mentioned above). While I admit that I believe that Moonitz held the above mentioned view when this manuscript was written, I must emphasize that I did not claim (or believe) that Mattessich or Lim (or Chambers) held this view. Instead, all I claimed [1976, p. 32] was that support for the validity of the ratio-scale view (*i.e.*, see the above definition of "ratio-scale view" in the context of GPLAHCSATRSV) is found in the works of these authors. My intention in making this claim was merely to establish that other authors had made comments which indicate that ratio scales are employed in historical-cost accounting (whether general-price-level adjusted or not) and, given the rationale mentioned above for the extensive ratio-scale version of the ratio-scale view, to establish that there may be a widespread tendency to accept the validity of this view.

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[6] As indicated above, Abdel-Magid [1979a] appears to argue that the intensive-ratio-scale version of the ratio-scale view is valid. I feel that Abdel-Magid's analysis fails to demonstrate the validity of this conclusion. If time allows, I plan to write a commentary on Abdel-Magid [1979a].

[7] In this context, note that I did not mean to imply that only one version of the ratio-scale view is possible. It appears that Abdel-Magid may have interpreted my remarks in this fashion even though I reference Lim [1966] and Larson [1967] in GPLAHCSATRSV (see footnotes 2 and 3 page 832).

One additional comment probably should be made concerning the beliefs of Moonitz, Mattessich, and Lim. That is, it seems to me that their beliefs, as well as my belief about their beliefs, are irrelevant to both the stated purpose and the actual conclusion of Abdel-Magid's commentary. This comment also applies to Abdel-Magid's concern over whether I maintain that Mattessich, Moonitz, *etc.*, hold (or held) the ratio-scale view in order to justify general-price-level-adjusted historical-cost statements.

Paragraphs 8 and 9 are meant to provide an analysis of the fallacies that supposedly are implicit in my discussion of the objects difficulty (also see Abdel-Magid, 1979a, paragraphs 19–23). Paragraph 8 is perplexing in this context. The theory of fundamental measurement requires that the phenomena subjected to measurement using extensive ratio scales constitute objects (*i.e.*, phenomena which possess physical form and properties which can be apprehended directly via our senses or by way of instruments which extend the ranges of our senses). Given this requirement, the objects difficulty says simply that it is quite difficult to argue that the accounting phenomena contained in the classes referred to by Abdel-Magid (*i.e.*, classes 2–7) constitute objects and, consequently, that it is equally difficult to contend that these objects belong to an extensive system and possess properties that can be measured via an extensive ratio scale. Yet, despite reading paragraph 8 innumerable times, I still find no meaningful relationship between the interesting sounding things that are contained in this paragraph and the objects difficulty (or related fallacies). Abdel-Magid apparently feels that functional definitions of the accounting phenomena mentioned above and attention to relevance will convert non-objects into objects; however, paragraph 8 fails to demonstrate the validity of this point in general or in the context of the objects difficulty. Paragraph 9 also is quite puzzling. At first, I thought that Abdel-Magid was arguing that accounts receivable, *etc.*, are similar to "cash" and, therefore, constitute objects. I necessarily reject this view since I can at least withdraw all the monetary units to which I have a claim on (or in close proximity to) the balance-sheet date and measure (or sense) any property of these units that I wish. In contrast, I cannot duplicate this scenario with an account receivable. Indeed, I may possess a claim to monetary units to be received in the future (as supported by either verbal or written evidence), but I cannot sense any property of such a non-object. In any case, after reading paragraph 9 several times, I became convinced that (intentionally or otherwise) Abdel-Magid actually was arguing that cash is a non-object (*i.e.*, see his reference to Stonier and Hague). Granting this view for purposes of argument alone, it appears that the objects difficulty is strengthened. That is, if cash is a non-object, it follows that there are more non-object accounting phenomena than I recognized previously and that the validity of the objects difficulty is enhanced. In summary, paragraphs 8 and 9 in no way refute (and, perhaps, actually strengthen) the objects difficulty. For completeness, I also wish to note that (contrary to the view presented in paragraph 9) I recognize the role and importance of money in society and that this role, *etc.*, has no bearing whatsoever on the question of whether cash is an object.

Paragraphs 10 and 11 are intended to cast doubt on the validity of the logical analyses which are implicit in the two aspects of the property difficulty. Ironically, the basic problem with these paragraphs is faulty logic. Specifically, Abdel-Magid maintains that "in the first aspect of the property difficulty, the reader is told that the ratio-scale view will be correct only if the property to be measured is an extensive property" and that "in the second aspect of the property difficulty the author changes the rule and assumes that the property is service potential (an intensive property) in order to prove that liabilities do not have the required property." The problem with this argument is that the nature of service potential is irrelevant to the second aspect of the property difficulty. That is, the second aspect of the property difficulty simply *assumes for purposes of argument* [*i.e.*, see Vickrey, 1976, p. 36] that service potential is the property measured via the historical-cost system (irrespective of whether service potential is extensive or intensive), argues that liabilities (under conventional definition) cannot possess service potential and concludes, consequently, that the extensive-ratio-scale version of the ratio-scale view is invalid (*i.e.*, unless unusual assumptions are made about the nature of liabilities in the context of historical costing and irrespective of the extensiveness or intensiveness of service potential). Of course, if service potential is not extensive, then this version of the ratio-scale view is invalid irrespective of whether liabilities possess this property (*i.e.*, given the above-mentioned for-purposes-of-argument assumption). The non-extensiveness of service potential is established firmly in the context of the operations difficulty.

The second problem with paragraphs 10 and 11 is related to Abdel-Magid's feeling that "the reader is first told that the property to be measured has not been identified" and later is told, in the context of the index difficulty, "that historical-cost values are measures of numerosity."[8] The difficulty here is that Abdel-Magid apparently feels that it is illogical to consider alternative interpretations for a property that has not been interpreted unambiguously. The logic behind this belief escapes me. In any event, as indicated in GPLAHCSATRSV, it is my view (irrespective of the *possible* consensus that service potential is the property that is supposed to be measured via historical costing) that many (if not all) historical-cost values are best interpreted as measures of numerosity (see Vickrey [forthcoming] for an analysis which deals with this possibility). Given the reasonableness of this view, the third aspect of the index difficulty implies that the extensive-ratio-scale version of the ratio-scale view is invalid. Thus, paragraphs 10 and 11 of Abdel-Magid's commentary do no damage to any aspect of GPLAHCSATRSV.

Paragraph 13 is meant to invalidate the operations difficulty. This paragraph is somewhat difficult to evaluate since it contains an apparent contradiction. Abdel-Magid first claims that "the operation required for validity of the ratio-scale is *not empirical but mathematical* (emphasis mine)." However, subsequently, he says "nevertheless, the nature of the *empirical* (emphasis mine) operation required for the validity of the ratio scale is fundamentally different from the nature of the operation used by Vickrey to invalidate the ratio-scale view." The first of these contradictory statements may imply that Abdel-Magid is confused concerning the nature of the operations which are required in order to establish a ratio scale and to demonstrate that any version of the ratio-scale view is valid. That is, in modern measurement theory, empirical operations are required in order to establish the validity of a ratio scale (*i.e.*, ignoring the ratio scales which are used in derived measurement), and mathematical operations are irrelevant in this context. If Abdel-Magid is confused on this point, then his confusion may have been prompted by over reliance on the works of Stevens. On this matter, Savage [1970, p. 171] says:

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[8] Note that I did not say that historical-cost values *are* measures of numerosity. Instead, I [Vickrey, 1976, p. 38] say ". . . a number of (if not all) historical-cost values may be best interpreted as measures of the numerosities of sets of homogeneous monetary units. . . ."

> The above clarifications of the concept of invariance and of the concept of a scale are partly designed to prevent an important misunderstanding of Stevens' view. It is possible to obtain the impression that Stevens believes scales can be classified merely by reference to the transformations that leave them invariant, without any reference to the rules for numeral assignment which create the scale. Thus Stevens might be interpreted as holding that if an experimenter has assigned numerals to loudness, or brightness, or "psychological weight," or "psychological length," then obviously he has in some way measured the dimension in question, and all we have to do to learn the type of measurement involved is to see whether the assignment of numerals remains invariant under this transformation or that, without any reference to the rules used in making the assignment. There is no very good reason to interpret Stevens in this way, but, in any event, it is important to point out the error in such a view.

The view that Abdel-Magid is confused on the above-mentioned matter also is supported by his puzzling statement that "it is possible to argue that the ratio-scale view implicitly assumes that accounting numbers are produced by a ratio scale and, hence, the empirical operations required for the validity of the ratio scale are also required for the validity of the ratio-scale view." Interpreted literally, this comment implies that Abdel-Magid believes that there is some version of the ratio-scale view that is consistent with Stevens's view of ratio scales and which does not assume that accounting numbers are generated via the ratio scale. Given that Abdel-Magid does not have this perplexing view in mind, it is likely that his comment actually implies that he believes that the intensive-ratio-scale version of the ratio-scale view depends on a type of ratio scale that can be established using only mathematical operations. Thus, as indicated above, it appears that Abdel-Magid is confused concerning the nature of the operations that are needed in order to establish ratio scales in general and to validate any version of the ratio-scale view.

The second of the contradictory statements mentioned above seems to imply that Abdel-Magid believes that the same empirical operations are required in order to establish both intensive and extensive ratio scales and that I employed the wrong set of operations in dealing with the extensive-ratio-scale version of the ratio-scale view in GPLAHCSATRSV. The interested reader easily can confirm the falsity of Abdel-Magid's apparent beliefs on these matters via reference to Suppes and Zinnes [1963], Pfanzagl [1968], and Krantz *et al.* [1971]. In sum, paragraph 13 in no way refutes the operations difficulty.

Paragraph 14 is meant to establish that I ignore "the nature of empirical operations in modern measurement theory" and the related notions of matching and mapping. This claim hardly seems reasonable given my definition of fundamental measurement, the cited works upon which GPLAHCSATRSV is founded, and my discussion of the operations difficulty. Abdel-Magid's confusion on this matter probably occurs as a result of his apparent failure to consider my cited references in an appropriate manner.

One last matter remains to be considered. That is, I find it curious that Abdel-Magid fails to consider the index difficulty in his commentary. The second aspect of this difficulty is particularly relevant to either version of the ratio-scale view. Consequently, it seems reasonable to argue that Abdel-Magid should have attempted to refute the index difficulty (especially the second aspect), given that his stated goal is to demonstrate that my conclusion concerning the ratio-scale view is unjustified. This omission is particularly puzzling in view of the following comments [Abdel-Magid, 1979a, paragraph 18]:

> There are two complementary aspects of ratio scales. First, ratio scales are measurement devices. An analysis of the tenets of ratio scales as measurement devices will naturally involve questions about the object, property, and operation of measurement. But ratio scales can also be viewed as a mathematical group structure (a similarity group) that allows a mathematical transformation of the numbers generated by the scale and still leave the scale form invariant. If one wants to analyze the ratio-scale view as a theory of accounting measurement, then the object, property, and operation difficulties are relevant arguments. In this case, those difficulties represent problems that are common to all accounting models, and there is no reason to attribute them [only] to Historical-Cost-Adjusted statements [see Vickrey, 1976]. On the other hand, if one thinks of the ratio-scale view as a proposal to adjust historical cost dollars by an index number to satisfy the tenets of the ratio scale, then the problem is mathematical, and the only relevant problem is the index number difficulty.[9]

Thus, Abdel-Magid's commentary fails to consider a difficulty which is relevant to the extensive-ratio-scale version of the ratio-scale view and which is the only difficulty that he considers relevant to the question of the validity of the intensive-ratio-scale version of the ratio-scale view. Obviously, this deficiency alone implies that Abdel-Magid's commentary fails to achieve its stated objective.

In summary, I find that Abdel-Magid's manuscript is faulty for a variety of reasons. These deficiencies imply that Abdel-Magid has failed to identify any legitimate problems with GPLAHCS-ATRSV (even though such problems very well may exist).

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[9] Note that I do not imply that the difficulties considered in GPLAHCSATRSV are relevant *only* to general-price-level-adjusted historical-cost statements.

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MANUSCRIPTS ACCEPTED FOR FUTURE PUBLICATION

(Accepted between February 10 and May 11, 1979)

Main Articles

Arie Baran, Josef Lakonishok and Aharon R. Ofer, "The Information Content of General Price Level Adjusted Earnings: Some Empirical Evidence"

Paul F. Williams, "The Evaluative Relevance of Social Data"

Cornelius J. Casey, Jr., "Variation in Accounting Information Load: The Effect on Loan Officers' Predictions of Bankruptcy"

Kurt Pany and Philip M. J. Reckers, "The Effect of Gifts, Discounts and Client Size on Perceived Auditor Independence"

Nicholas Dopuch and Shyam Sunder, "FASB's Statements on Objectives and Elements of Financial Statements: A Review"

Notes

Bikki Jaggi, "Further Evidence on the Accuracy of Management Forecasts vis-à-vis Analysts' Forecasts"

Dan S. Dhaliwal, "The Effect of the Firm's Capital Structure on the Choice of Accounting Methods"

John S. Hughes and James H. Scheiner, "Efficiency Properties of Mutually Satisfactory Cost Allocations"

Comments

Kung H. Chen and Richard W. Metcalf, "The Relationship Between Pollution Control Record and Financial Indicators Revisited"

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BOOK REVIEWS

Thomas J. Burns, Editor

EDITOR'S NOTE: Books for review should be sent to Professor Thomas J. Burns, The Ohio State University, 1775 College Road, Columbus, Ohio 43210.

(The policy of the *Review* is to publish only those reviews solicited by the Book Review Editor. Unsolicited reviews will not be accepted.)

J. SCOTT ARMSTRONG, *Long Range Forecasting: From Crystal Ball to Computer* (John Wiley & Sons, Inc., 1978, pp. xvi, 612, $25.00).

This book encompasses a much broader treatment of forecasting and prediction than is implied by the title. Short and intermediate forecasting are extensively covered, and the computer is hardly mentioned except for a listing of references to computer programs in an appendix. The author describes *Long Range Forecasting* (LRF) as a "friendly" book about forecasting uses and abuses. The reader and beginners in forecasting, may find it "friendly;" however, many experienced practitioners and authors will not find it so, as Armstrong challenges widely held beliefs regarding forecasting.

On the "friendly" aspects of LRF, the humorous writing style contains cartoons and author's puns. The book is more of an easy-to-follow guide on how to forecast, from structuring the problem through evaluation and implementation, than a technical exploration. How forecasting can be used most effectively is described, and references are suggested where the mathematics of the methods are best explained. Many aids are provided for comprehension, including flowcharts, tables ranking methods, lists of do's and don'ts, and frequent summaries.

LRF will not be regarded as "friendly" by many authors. Two reference lists are provided which are bound to create controversy, while still providing a valuable survey of the literature. Each of the almost 800 references in the first list are annotated briefly, rated by a four-star system, and coded by the method used, field examined, and if empirical evidence is included. Obviously, those authors receiving four stars will regard it as "friendly" and those not receiving any stars will not find it so. Even less "friendly" is a second list of references which is described as "The Don't List." These 160 items are of "promising titles" which "appeared in the better journals" that are "of no value in the study of forecasting methods for the type of reader that would read LRF."

Others will find many of the conclusions reached as not "friendly." For example, the Box-Jenkins method and spectral analysis are found to be a "raindance" (a term used to describe complex methods that are no more accurate than simpler methods, but which attract big money). Econometric models are found to be most useful for large changes in the causal variables, not for small changes where most econometric forecasting is involved. Causal methods are not found to be superior to naive methods for short-range forecasts but are superior for long-range forecasts. Stepwise regression should be avoided. These conclusions (and many others) are supported through references to literature containing empirical evidence. Those who disagree with the conclusions may find their belief's challenged by Armstrong's evidence.

LRF is also not "friendly" to researchers (who "find problems because they have solutions that they can use" and "look for confirming rather than disconfirming evidence"); expert judges and forecasters (whose "education and experience . . . increase confidence but not accuracy"); and academic journals ("replication is held in higher esteem than relevance").

Who is most likely (and least likely) to find LRF (tested by the author over a seven year period) useful as a text in a college forecasting course? Of special value to students conducting forecasting projects, especially beginners, the text will be useful for graduate courses in research design. Probably the experienced forecasting practitioner will find the book a comprehensive synthesis of research in many fields as well as a challenge to existing beliefs. The users of forecasts might read the book, but would probably find it too involved. Accountants and auditors seeking specific knowledge about preparing and reporting on financial forecasts will find little of immediate use.

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NORTON M. BEDFORD, KENNETH W. PERRY, and ARTHUR R. WYATT, *Advanced Accounting: An Organizational Approach*, Fourth Edition (New York: John Wiley & Sons, 1979, pp. xix, 892, $19.95).

The authors of any accounting text have a major problem in selecting the topics to be included and the relative emphasis afforded the various topics. This appears to be particularly true for the authors of advanced accounting texts. But conventional advanced texts do include coverages of consignment sales, branch accounting, insurable risks, governmental and non-profit accounting, and, always, major attention is devoted to consolidations.

The contents of this text are conventional and very similar to the third edition except for two new appendices. The bulk of the book is devoted to consolidations. Partnerships and proprietorships are integrated in other chapters except in one part. Some instructors might prefer that such material be in separate chapters according to the type of organization rather than what might be thought of as a "functional approach." Part V is organized in terms of proprietorship, partnership, and corporations in separate chapters. If other areas of partnership coverage had been organized in that way, the text would be more flexible.

There appears to be an overemphasis in the area of partnerships. The admission and retirement of partners and the distribution of partnership profits could have been reduced.

There is a good balance between concepts and procedures. Alternatives and theory underlying the different approaches are discussed well. The use of both journal entries and worksheets are a great aid to the learning process. A trial balance approach is also presented. In the area of consolidations, the authors' basic approach of (1) establishment of reciprocity, if necessary, (2) eliminations of the reciprocals, and (3) the consolidation of the non-reciprocals is well developed. Throughout the text, legal, theoretical, and accounting considerations are well integrated and illustrated, including the latest pronouncements.

Although the end-of-chapter material is not divided into the usual "question," "exercise," and "problem" categories, they are adequate in terms of number, degrees of difficulty, and quality. A very high percentage are AICPA-adapted and are quite similar to those in the third edition; the text would have benefitted from more updating of this material.

In summary, the text compares favorably with the other conventional advanced texts. A decision for adoption may depend on what an instructor prefers in the organization of material and the topic coverage desired other than consolidations.

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JAMES B. CAMERON, CHARLES J. WOELFEL and JAMES W. PATTILLO, *Advanced Accounting: Theory and Practice* (Boston, Mass.: Houghton Mifflin Company, 1979, pp. xv, 816, $18.50).

As noted in the preface, this text covers not only the traditional advanced accounting topics but also presents the accounting and reporting practices of selected regulated industries and SEC and other governmental reporting regulations.

After discussing a chapter on accounting for branch operations, the next five chapters are devoted to business combinations. Procedural aspects of purchase accounting and pooling of interests are illustrated. Unfortunately, however, conditions for a pooling of interests are not explored in detail except for a flowchart included in an appendix. This chapter also introduces an illustration of the cost and equity methods. This illustration would have been more appropriately included in the next chapter, where consolidated statements subsequent to the date of acquisition are discussed. The partial work papers for each illustration are very helpful. Two chapters are devoted to special problems associated with consolidation. The final chapter offers accounting and reporting issues of multinational corporations.

The three chapters on the partnership are good. Estate and trusts and corporate entities in financial difficulties are well presented. One chapter outlines accounting for various funds of a local government unit, with a brief discussion of hospital accounting. Another chapter emphasizes the reporting requirements of the SEC.

The materials on regulated industries, which make this book somewhat unique, are discussed in two chapters. The discussion is extensive but dull. Furthermore, the numerical illustrations are rather poor. One chapter discusses accounting and reporting practices of the construction, real estate, and franchising industries. Another chapter considers the operating and accounting characteristics of three regulated industries: banking, insurance, and public utilities. The last chapter outlines interim and segmental reporting.

In summary, whenever there are various approaches to the issue (or problem), the authors demonstrate alternatives and adopt a preferred (or widely used) practice for illustration. But the coverage of materials is not even. Fund accounting could be examined in considerably more depth. In addition, some theoretical aspects of regulated industry accounting are not well blended into the procedural aspects. More numerical examples are desirable.

Provided that the instructor supplements the governmental and regulated industries chapters, this text is recommended to instructors looking for something new.

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EDWARD N. COFFMAN, Editor, *The Academy of Accounting Historians Working Paper Series Volume I, Working Papers 1-20* (Alabama: The Academy of Accounting Historians, 1979, pp. 368).

This collection of 20 papers reflects a wide range of objectives and uses of accounting history. Some papers reflect the use of history in the teaching process, others might be labeled "literary" history, and still others "scientific" history. Some are biographies and chronological listings of events, while others attempt to discover whether selected practices or ideas may have existed earlier than was previously thought. The only working paper that does not fit neatly into any one of these classes is No. 19. "The Study of Accounting History," by Vahe Baladouni. If I were editor, this WP would have come first, because it is concerned with the necessity of studying accounting history.

There are working papers which recreate the past. But there are others aimed at discovering actions of accountants in the past in order to provide a perspective for making better current decisions. The three working papers by John L. Carey are excellent examples of the literary approach to accounting history. Mr. Carey not only recreates the past in which he was personally involved, but he also helps explain the current CPA profession. Raymond J. Chambers' working paper, "The Development of the Theory of Continuously Contemporary Accounting," is another example of literary history in that he attempts to trace his own thinking from the mid-1940's. Unlike Carey, however, Chambers focused more on his theory construction in his various writings as it related to perceptions of the changing environment.

Nos. 11, 15, 18, and 20 are clearly of the scientific history variety. For example, Richard Vangermeersch, in No. 15, reports the results of two studies. The first study is a report of a historical survey before 1930 on the valuation of intangibles. The second portion reports the results of how 200 companies revalued tangible fixed assets during the 1920s. Nos. 3, 4, 7, and 10 are difficult to classify. They all have some elements of both scientific and literary history. Furthermore, the authors are attempting to demonstrate the existence of a practice or idea at a time earlier than previously thought, or summarize the state of accounting existing in a particular place, at a particular time. K. Most, in No. 3, suggests that if an accounting technique can be traced back thousands of years, it may be more related to the nature of man itself (*i.e.*, character and personality) than to the Renaissance period of technological inventions.

In contrast to historical writings in most other disciplines, the study of accounting history is in its infancy. As a result, bibliographies, research sources, and chronological indices of important events are important tools to accumulate for the research process. Nos. 6, 8, and 9 contribute to this accumulation. Gary Previts presents an excellent chronological index of events between 1896-1970 in Nos. 6 and 8 for the above-mentioned papers by Carey. Two working papers are included because they represent examples of how accounting history can be utilized in the learning process. No. 2, by Richard Homburger, suggests how the use of accounting records of a particular time period and geographical area may have an impact on accounting systems development.

Almost anyone would conclude that this publication encourages research, publication, and interchanges in all phases of accounting history. Although the use of the book as a text, however, is limited, it could be used as a supplemental readings in a theory or accounting history course. Otherwise, its main value is as an aid in the research process.

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COMMITTEE ON INTERNATIONAL ACCOUNTING OPERATIONS AND EDUCATION 1976-1978, *Accounting Education and the Third World* (Sarasota, Florida: American Accounting Association, 1978, pp. 109; free to AAA members).

This monograph addresses the general issues of accounting education by focusing upon the historical analysis and status quo of accounting development in the five regionally different countries of Egypt, Malaysia, Mexico, Pakistan, and Tanzania. This analysis provides the framework from which suggestions and subsequent appeals are made. The faculty study identifies educational needs and raises issues which are certainly not limited to Third World countries.

The first part sets up a conceptual framework for the significance and need for accounting, and is convincing. The second part provides interesting analyses of the development of accounting in five regionally selected countries. The last part suggests some challenging suggestions for structuring accounting education and development. However, the interchangeable use of the terms "accounting" and "accountancy" is somewhat confusing.

The underlying theme is to increase awareness of the role of accounting within an economic environment and its relationship to socio-economic growth and development. A great weakness in many Third World economies has been the lack of correlation between educational requirements and the socio-economic environment. These concepts are outlined in Part One and pragmatically supported in Part Two. The analysis of the five countries is detailed, and focuses upon the deficiencies in the nature and development of formal academic accounting programs, the inadequate stature of professional accounting groups, and the non-existence of continuing education programs. When faced with all of these issues, the reader should have a feeling of responsibility for examining his or her own accounting academic environment.

The suggestions are extremely challenging and far-reaching in view of the required financial support. The American Accounting Association is viewed as playing the primary role in the improvement of accounting education in Third World nations, and a possible framework is suggested in the Appendix.

This monograph achieves its purpose in making the reader aware of the role of accounting as "a spur to socio-economic growth and development" (p. 3). Even more important, it delineates possible ways and means by which accounting assistance can be rendered to Third World economies. Some more developed nations also would help themselves by undertaking such a task. For anyone concerned with accounting education, this study should instill a sense of responsibility and, it is to be hoped, elicit some particular commitment.

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GARY M. CUNNINGHAM and CHARLES H. SMITH, assisted by BYRON L. OTTO, *Accounting for Shareholders' Equity by Texas Corporations* (Austin, Texas: Bureau of Business Research, The University of Texas at Austin, pp. x, 111).

Legal statutes and generally accepted accounting principles relating to shareholders' equity accounting are often not in agreement, the authors have found. Based on a study of statutory law, case law, and accounting principles, this monograph has been prepared to aid practitioners to appropriately account for the shareholders' equity portion of the balance sheet.

Unlike most financial accounting texts that discuss shareholders' equity accounting generally, this guide is specifically concerned with the accounting treatment in Texas. The guide provides scholarly treatment of most complex events affecting corporate balance sheet presentations of shareholders' equity. In addition to preliminary discussions on classification and accounting for shares issued, the authors have included coverage of share subscriptions, treasury shares, dividends and other distributions, and a host of miscellaneous topics (*e.g.*, mergers and consolidations, conversions, quasi-reorganizations, and share options and rights). The text lacks a discussion of conclusions, and indications of copyright dates and publishers are missing. Only an attached flyer identifies the book as a publication of the Bureau of Business Research, The University of Texas at Austin.

Due to its narrow scope, this monograph will be of little value to anyone who is not associated with a Texas corporation. Although the issues raised are important to accountants in every state, the theme of the book is so geared to Texas corporations that it really cannot be recommended to readers outside the state. It might be useful, however, to utilize this work as a model for developing a similar guide in other states.

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Jonathan Davies, Editor, *1977 Accounting Research Convocation: Papers Presented at the 1977 Accounting Research Convocation on the Subject of Patterns of Change* (University, Ala.: The University of Alabama, 1977, pp. ix, 159, $3.50).

The title is a capsule review of the book, which consists of ten papers, two each on five topics, presented at that convocation. The topics are: rational expectations, the theory that decision makers behave rationally and use all available information; applied research in accounting; the quality of governmental accounting; international accounting standards; and the management of an accounting practice. Seven of the writers are primarily practitioners, and three are primarily academicians.

Only a moderate background in accounting is necessary to understand the papers. The papers provide general background rather than depth of coverage. Only one paper requires an extensive knowledge of mathematics.

While the treatment of change varies, the papers are concerned with a description of what changes have or might occur. They are not concerned with the impact of change, the value of change, or the ability of the preparer and user of accounting information to assimilate change. For example, there is no coverage of the concept that accounting is a product of its society and therefore changes as the society changes. To study changes in accounting, one must study societal changes.

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Don T. DeCoster and Eldon L. Schafer, *Management Accounting: A Decision Emphasis*, Second Edition (New York: John Wiley & Sons, Inc., 1979, pp. xiii, 772, $15.95).

As an introductory text in management accounting intended for use as a second or third course in accounting, "this book focuses the student's attention upon the primary purpose of data-decisions by management." This edition represents a significant revision of the first edition. The organization of the chapters has been changed from three to five major parts. Three new chapters are added on budgetary control, financial planning of resource levels, and not-for-profit organizations. Microeconomic theory has been eliminated in this edition. Cost behavior patterns and cost-volume-profit interaction are rewritten and treated as two separate chapters.

The concepts and techniques discussed in each chapter are clearly explained. However, the following topics are not covered: marketing or distribution costs, decision theory and value of information, and income taxes and business decisions. The discussion of the behavioral aspects of budgets is too brief; also, more emphasis should be given to such topics as the behavioral considerations in setting standards, the effects of accounting systems on users, and the problems of communicating accounting data.

Approximately two-thirds of the problems are new or rewritten, with more problems provided for service and not-for-profit organizations as well as for manufacturing companies. A short description of each problem is also added in the text to facilitate homework problem selection.

This well-written text emphasizing the use of information merits serious consideration for a conceptual course in introductory management accounting.

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Roland E. Dukes, *An Empirical Investigation of the Effects of Statement of Financial Accounting Standards No. 8 on Security Return Behavior* (Stamford, Connecticut, Financial Accounting Standards Board, 1978, pp. ix, 102, $3.00).

This research monograph reports the results of a study commissioned by the FASB with the following objective: "to investigate whether, in general, the common stock security returns of multinationals were significantly affected by the issuance and implementation of FASB Statement No. 8 [SFAS 8]." In a nutshell, Professor Dukes concludes in Chapter 2 that they were not. More precisely, as he notes in Chapter 4, his results really constitute failure to reject the null hypothesis of no significant return differences. He argues that the jump to a positive conclusion is justified because "If, having conducted the most thorough and demanding tests possible, that is, maximizing the opportunity to reject the null, and if the null is not rejected, then, while it is not proven that the null is true, confidence is gained that the theory underlying the null hypothesis is valid. Such is the case in this study." The theory to which he refers in this passage is the "Efficient Markets Hypothesis" regarding fully-disclosed changes in bookkeeping procedures. He goes on to state that since his findings are fully consistent with the "Efficient Markets Hypothesis," the findings are not surprising.

This study does clearly represent up-to-date testing procedures in the area of Efficient Markets research. Starting with all firms listed on the New York Stock Exchange (NYSE), he extracted all those for which foreign currency translation accounting procedures could be identified for 1974 using the *Disclosure Journal* and for which monthly security returns were available on the CRSP tape between January, 1965 and December, 1976. The 479 firms so identified were split into six experimental groups (portfolios), depending on the translation method used (Current-Noncurrent, Monetary-Nonmonetary, or Hybrid) and the method used to recognize foreign currency adjustments (flow-through or deferral). A control group (portfolio) of equal size was formed for each experimental group by randomly selecting NYSE industrial firms with no multinational operations disclosed and with monthly returns data also available over the 1965-1976 period. For each of the six pairs of portfolios, differences in average monthly risk-adjusted security returns were examined in three separate time periods:

(1) January, 1968-December, 1969—Stable Exchange Rates and Pre-SFAS 8
(2) January, 1970-December, 1974—Volatile Exchange Rates and Pre-SFAS 8
(3) January, 1975-December, 1976—Volatile Exchange Rates and Post-SFAS 8

Using multivariate procedures to test for the six differences simultaneously, Professor Dukes was not able to reject the null hypothesis of no differences in returns in any of the three periods. Comparable results were achieved when the tests were changed to compare risk-adjusted returns for the six experimental firms with returns for the market as a whole. This was also true when the author compared risk-adjusted returns for the five experimental groups affected by SFAS 8 with risk-adjusted returns for the other group which was already using the procedures mandated by SFAS 8 (an implicit control group). At an individual firm level, he also could not reject the either null hypothesis that systematic security risk did not change after the adoption of SFAS 8 or the null hypothesis that the variance of the error term in the OLS regressions was not larger in 1976 than in 1975. No major problems with the research design employed were found, and it does constitute "state of the art" work.

However, the author's interpretation of his findings is subject to serious question. His conclusion that the results are consistent with the "Efficient Markets Hypothesis" rests on the following logic:

1. There is considerable evidence (Kaplan, 1978) that market agents will not be confused and misled by the changes in the way foreign currency adjustments are reported as a result of SFAS 8 (page 18).
2. There is little or no empirical evidence that managers have altered their decision making as a result of SFAS 8 in ways that have led to economic changes as well as bookkeeping changes (page 22).
3. According to the accumulated evidence regarding the "Efficient Markets Hypothesis," there should be no market reaction to a fully-disclosed pure bookkeeping change such as that required by SFAS 8 (page 23).
4. In this context, failure to reject the null of no return differences can be interpreted as positive evidence in support of the "Efficient Markets Hypothesis" (page 44).

All three steps leading up to the conclusion in this causal chain can be questioned:

1. There is really very little published evidence about capital market reaction to accounting changes that are complex, poorly understood, and only minimally disclosed. The studies on LIFO versus FIFO, accelerated depreciation, and investment tax credits deal with well-understood accounting issues and are not necessarily relevant in the context of SFAS 8.
2. On the other hand, there is a substantial body of systematic empirical evidence that corporate managers did change their decision-making as a result of SFAS 8 and that such changes do affect the economic position of the firm. In fact, one such study was published by the FASB as a companion monograph to this one. [Editor's Note: This study, *The Impact of Statement of Financial Accounting Standards No. 8 on*

the Foreign Exchange Risk Management Practices of American Multinationals: An Economic Impact Study, by Thomas G. Evans, William R. Folks, Jr., and Michael Jilling was reviewed by the same reviewer in the July issue of *The Accounting Review*.]

3. If there is little prior evidence about reaction to bookkeeping changes as complex as those mandated by SFAS 8 and if there *is* evidence that SFAS 8 has caused economic changes as well as bookkeeping changes, then the accumulated EMH evidence implies nothing about what results Professor Dukes should expect.

In conclusion, this monograph represents an important piece of research regarding the impact of SFAS 8 in the securities market, but the conclusions are marred by an unconvincing attempt to subsume them under the rubric of market efficiency. Although the monograph presents no evidence at all about market efficiency, it does present important findings about market reaction to SFAS 8 which every student of accounting research should read and study.

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M. W. E. GLAUTIER and B. UNDERDOWN, *Accounting Theory and Practice* (London: Pitman Publishing Limited, 1976, pp. xvi, 750, paperbound £2.45).

Based on the premise that the traditional emphasis placed in first-year accounting texts is too narrow and too procedurally oriented, this book offers a much broader view of accounting in which the emphasis is placed on the emerging social role of accounting as a provider of information for decision makers. Hence, unlike most first-year texts, this one does not follow the traditional balance sheet approach. Rather, a systems approach to accounting is used in which the interdisciplinary nature of accounting is explored in terms of the sociological, behavioral, and economic aspects of decision making.

The first part is a conceptual and historical framework for the rest of the book. An argument for a normative theory of accounting sets the stage for the second part in which a critical analysis of traditional accounting practices and conventions is provided. Arguing from an economic point of view, the transactions approach to accounting is criticized and accounting principles such as revenue recognition and historical cost, it is argued, limit the usefulness of financial statements for decision making. The remaining chapters in this part vary from traditional material covered in most first-year accounting texts to a chapter on the preparation of consolidated financial statements. With a descriptive format, the textbook does not include any problems or exercises, although a supporting workbook is available to instructors.

The third part is a self-contained unit on managerial accounting and includes not only the usual material found in first-year texts but also more sophisticated topics, such as utility theory and risk analysis. According to the authors, the need for relevant information for decision making by management has resulted in a more advanced development in the area of cost and management because accountants are free of the constraints imposed on them by financial accounting conventions. Consistent with their broader view of accounting, the authors argue that accountants should expand into the design of information systems.

The departure from most first-year texts is even more evident in the last two parts, where such concepts as income measurement theory, corporate social reporting, and human resource accounting receive extensive coverage. Included in these sections are arguments for current value accounting, social reporting, and uniformity in accounting standards.

This text represents a comprehensive and critical approach to accounting. Those instructors who are disenchanted with the traditional approach to teaching accounting should find the book refreshing, whereas the traditionalists will probably consider it to be too radical. No doubt, however, it will be of most interest to United Kingdom instructors, since the differences between the English and American systems of accounting would make the book somewhat difficult to adapt for usage in the classroom in the United States.

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ANDREW A. HARIED, LEROY F. IMDIEKE and RALPH E. SMITH, *Advanced Accounting* (New York: John Wiley & Sons, 1979, pp. xi, 717, $17.95).

Designed for a one-semester or two-quarter course in advanced financial accounting, this text covers many of those selected topics not found in other segments of the financial accounting sequence, such as: business combinations and consolidated financial statements, investments in unconsolidated investees, foreign currency transactions, partnerships, and fund accounting. The authors have attempted to provide a comprehensive treatment of each of these topics. As they state in the preface, ". . . it is preferable and more satisfying to both student and instructor to cover a selected number of topics in depth rather than to undertake a superficial coverage of a larger number of topics" (p. ix).

Ten chapters deal with the various aspects of consolidations. The first one discusses both the purchase and pooling of interests methods, with special emphasis on the historical development of business combinations. Six chapters are devoted to the fundamental concepts and techniques of consolidating investments in subsidiaries and of reporting unconsolidated investments via the equity method. An interesting and somewhat unique aspect in these chapters is the presentation of consolidating workpapers where the investment is recorded under the cost, as well as the equity, method. Also, deferred taxes are integrated into these chapters where timing differences in income exist due to the consolidation procedures or applying the equity method. Three chapters provide a detailed discussion of several miscellaneous consolidation problems, such as changes in equity interest, indirect ownership, and intercompany bond holdings. The authors note that these three chapters may be deleted if necessary without loss of continuity in the first seven chapters.

Home office and branch accounting, foreign currency transactions and translation of financial statements, and segment reporting are dealt with in three chapters. The foreign currency chapter provides details on the various provisions of FASB Statement No. 8 but ignores, to a large extent, any discussions on the apparent shortcomings of that pronouncement. Included in the segment reporting chapter is an analysis of FASB Statement No. 14 provisions on foreign operations and export sales. This chapter, however, does not delve into the appropriateness of the arbitrary rules of thumb presented in 14.

Three chapters present the standard fare pertaining to partnerships. The last two chapters deal with governmental accounting fundamentals and discuss the current positions of the National Council on Governmental Accounting.

There are certain topics covered in other advanced texts which are not found in this text, such as installment-sales, interim reporting, forecasts, fiduciary accounting, and real estate and franchise accounting. While some of these areas are often dropped from coverage in the advanced accounting course, it seems somewhat peculiar that interim reporting and forecasts, for example, are not included in the text, particularly with the recent interest in these topics by the FASB and SEC.

The text appears to be especially appropriate for an advanced course where the major focus is on consolidations and partnerships. The treatment is more comprehensive than that found in most other current texts which are available. For those curricula where the advanced course contains coverage of several areas in addition to corporations and partnerships, however, significant deletions in the textbook coverage of these two topics would be necessary. As the authors suggest, the last three chapters on consolidations can be dropped. If condensing of the partnership chapters is required, certain sections from each of the three chapters must be selected. This practice, unfortunately, is common with other advanced texts as well. Finally, outside materials will, of course, be necessary if coverage in the advanced course is to include any of the topics not discussed in this text which were alluded to above.

The book reads quite well. The chapters on consolidations and foreign currency become quite technical, but that is to be expected. Each new concept, however, is adequately explained and reinforced with the use of extensive illustrations. There is a large assortment of problems.

Overall, this text appears to be a good addition to the field of advanced accounting. The text should be given serious consideration, particularly for those courses which concentrate on consolidations plus one or two other subject areas.

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DAVID F. HAWKINS and WALTER J. CAMPBELL, *Equity Valuation Models, Analysis and Implications* (New York: Financial Executives Research Foundation, 1978, pp. vi, 196, $3.50).

This report "identifies, classifies and describes selected proprietary analytical techniques and valuation models used in the evaluation of individual stocks by leading institutional research and investment firms whose public materials were either reviewed or their officers interviewed during the research project" (page 1). Participants were 75 institutional investors and research firms. The hope is to "help the corporate officers to have a better understanding of the way the performance of their company may be reflected in the market price of their stock" (page vi).

A basic, non-technical, description of the theory necessary to understand the formal analytical techniques used in practice is provided. The emphasis is on the present value of a stock's future stream of dividend payments. The constant and multi-period growth rate models are discussed, as is modern portfolio theory and related matters such as risk. A variety of stock valuation approaches which incorporate present value calculations are described. These approaches involve straight application or slight variation of the two dividend models. However, the model of The First Boston Corporation discounts future *earnings*.

An examination of a stock's current price-earnings ratio (relative to the past) is reported as the most popular analytical technique used in practice. However, the emphasis given to the technique is declining. A small group of users is reported as concentrating on identifying stocks that can be purchased at a price below book value per share, net current asset value per share, or even cash value per share.

The projected growth of dividends or earnings is a key variable in equity valuation models and some relative price-earnings approaches. The sustainable growth rate equations are covered, with specific attention given two particular applications—the Profitability Profile and the Bisect Program. The evolution (during the 1970s) from a consideration of earnings growth records and forecasts to a more cash-oriented analysis is developed. This has come about largely because of the deficiencies in historical cost income measurements. There is a description of the ways in which the quality of earnings concept enters the stock valuation process.

Point scoring systems used to rate investment quality are described. Relevant variables and their weightings are a function of user investment objectives, experience, and research. Historical cost financial statement data are weighted heavily as are the growth rate, and continuity of past earnings, and dividend payments. The impact of inflation is taken into account as are product, management, economic, industry, and product-related variables. The extent to which inflation is considered, is covered. Users have access to relevant data for industry as a whole. At the firm level, little is done to adjust historical cost statements for inflation, mainly because of a lack of relevant data. The adjustments that are made, are mainly with respect to income statement information. Users resort, instead, to analyses aimed at helping form judgments of a company's ability to cope with inflation.

The study contains a wealth of information of potential use to a variety of users. The material is readable. Technical matters are covered in footnotes at the end of each chapter. Clearly, theory has had an impact on practice, and the specific approaches that are used to make operational some of the theoretical models are noted. Illustrations (examples, charts, computations, tables, *etc.*) are usefully employed to describe practice. Comments by survey participants are well integrated into the discussion of findings. The information should be quite valuable to those (practitioners and academics) who are interested in finding out what specific modifications need to be made in practice in order to make operational the theoretical models.

Those interested in the "how to" and the reasons for specific practices will derive much benefit from this study. Useful insights can be obtained regarding the manner in which the market in the aggregate "sees through" accounting numbers, and how accounting information is combined with information from other sources. Graduate students in accounting and finance would do well to use this book in conjunction with conventional accounting, finance, and investment analysis textbooks.

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CHARLES T. HORNGREN and J. ARTHUR LEER, *CPA Problems* and *Approaches to Solutions*, Fifth Edition (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1979, pp. xvii, 742, $17.95 and pp. viii, 376, $11.20).

These books are tailored for a CPA problems course. While the two-volume set does offer a comprehensive review of all four sections of the CPA examination, the text is true to its title because its emphasis is on CPA problems, especially problems in the accounting practice portion of the CPA exam. The first book contains various accounting practice topics with general discussions, selected CPA problems, and some suggested specific approaches to solving the problems. Theory, auditing, and law are included, but with less narrative. The second book contains solutions to the problems and answers to the questions posed in the first book. This segregation of problems and solutions into separate volumes offers flexibility for classroom use.

In the accounting practice section, the division of topics by subject matter is excellent. The general introductory material for each topical section in accounting practice is concise and thorough in its identification of major issues. While the presentation of the financial topics is well done, the three managerial accounting sections are considerably weaker. The material could be enhanced through additional vertical delineation into such traditional segments as process cost, standard costs, and cost-volume-profit analysis. The selection and assembly of past CPA exam problems by subject matter is masterful. Other than for the most recent exams, a student would certainly not need to purchase old CPA exams. Furthermore, the authors focus on exam questions from the May 1973 through May 1978 exams, although they do retain certain favorites from their prior edition.

The problem choices in the numerous financial sections are superior to the problems in the managerial section; the latter selection is hindered somewhat by a dearth of good managerial problems in recent exams. Specific techniques or hints on each problem to help the student to proceed efficiently toward his solution are provided. These brief explanations which do not reveal the answer do encourage students in their self-study. For the solutions in the second volume, the thinking, logic, and additional computations have been added to the AICPA solution. Again, this approach is particularly helpful in self-study.

While past CPA problems have been effectively grouped into topical areas, the multiple-choice questions are not. In future editions, the multiple-choice questions should be separated by topics and integrated into the topical problem areas. If theory were merged into accounting practice and treated as one unit, the text would be even more effective.

For theory, auditing, and business law, the text does provide a good composition of relevant material from past exams. While the preselection is helpful, important issues could be outlined and narrative included to provide the specific approach used. The solutions are also included without comment. In short, the approach for these areas does not measure up to the one used for accounting practice.

Among the new features is a tax chapter where the authors have updated all tax questions and problems using the latest Code. Other changes include a major revision of the governmental and institutional accounting section, with more understandable discussions of the individual funds and groups of accounts, and several charts. Leases have been added to the fixed assets topics and pensions added to the liabilities chapters.

The May 1978 exam is included only in total and is not integrated into topic sections. A book of this kind will be almost constantly out-of-date. However, following this edition, the authors will now provide comprehensive annual supplements.

A feature of the book is that it does suggest a general approach to each topical group of problems and then a specific approach to each problem. Although the text contains a good set of questions in the other areas, its chief merit is the selection, organization, and enlightening comments on the accounting practice problems.

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JAMES O. HORRIGAN, Editor, *Financial Ratio Analysis: An Historical Perspective* (New York: Arno Press, 1978, $20.00).

As part of the Arno Press collection on accounting history, this book is designed to provide historical perspective to financial ratios as an early analytical device used to interpret financial statements. The anthology presents articles selected mainly from early 20th century literature, but ends before the current era of rigorous theory and sophisticated quantitative analysis. Unfortunately, the printing and production process is such that many of the articles are impossible to read without eye strain and a magnifying glass.

The articles are separated into six sections without any added commentaries or interpretive statements. The first section consists of two articles providing an overview of general history on the early use and development of ratios. One of these articles, written by the editor, includes a discussion and summary of many of the articles that follow in the book.

The second section consists of articles written by early proponents of financial ratio analysis. Alexander Wall performed an empirical study of the variations in several ratios found between different industries and geographical locations. In contrast, there are four articles written by Roy Foulke, analyzing and espousing 12 ratios as the most important analytical devices. Two articles, authored by Arthur Andersen, promote the significance of balance-sheet, operating, and turnover ratios as indices of management's effectiveness. J. H. Bliss does a detailed ratio analysis of comparative financial statements of a firm, while advocating the inclusion of such analysis in the annual report. The last article, also written by Bliss, refers to the distinctive differences in operating and financial ratios among industries.

The third section on early critics of financial ratios consists primarily of an article written by William Paton, decrying the use of ratios as substitutes for the financial statements themselves.

The fourth section deals with the early empirical studies of financial ratios. Arthur Winakor and Raymond Smith studied the efficiency of ratios as predictors of financial difficulties. Paul Fitzpatrick compared the trend of ratios between groups of successful and failed companies. The final article, written by Charles Merwin, utilizes income tax returns to find the most sensitive indicators of business discontinuance.

The fifth section deals with more recent criticism of the problems and shortcomings of ratios. Nathaniel Jackendoff warned against the duplicity of ratios. Tom Nelson found that the capitalization of leases affects many ratios. George Holdren concluded that LIFO changed inventory turnover significantly compared to FIFO. Finally, F. K. Wright performed a detailed examination of the current ratio.

Included in the final section on new ratios and systematic models is an article by George Sorter and George Benston supporting the use of funds flow as an alternative to the current ratio. Also, a British Institute of Management report attempts to set out general principles in the use of ratios as devices for inter-firm comparisons.

Obviously highly specialized, this book is a worthwhile addition to any collection on accounting history. I enjoyed reading it.

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DONALD F. ISTVAN and CLARENCE G. AVERY, *Accounting Principles* (New York, Harcourt Brace Jovanovich, Inc., 1979, pp. xxi, 1,095, $16.95).

Congratulations are due to the authors for experimenting with an innovative design for the presentation of traditional topics in introductory accounting. New approaches need to be studied in the teaching of an increasingly complex subject. Yet few books deviate from a conventional presentation format. While adhering to a traditional progression of the related topics, this book dares to be different.

Intended for a two-semester course at the introductory level, the book may be used in, and the authors have tested, a one-semester (two-quarters) introduction to financial accounting utilizing certain key chapters recommended in their instructors manual.

Each chapter commences with a short practical thought which leads into a particular topic. A brief outlined form of "Where We Are Going" is presented. As the text progresses, there is an addition of "Where We Have Been" and a "Recap and Glance Ahead" section at the end of the chapters. These aids are reinforcing tools for the student and stress the basic accounting system. Brief comments are offered throughout the chapters referring to the accounting system considered up to that point—good reinforcement for learning. The first few chapters rely very heavily on the illustrative method of teaching the elements of the accounting cycle. This provides a rather procedural presentation of accounting; however, brief conceptual notations are interjected.

The use of dark bold type and green ink for key points assists the student in grasping new terms. Also, new words are listed at the end of each chapter, and a glossary is available in the back of the text. All of the necessary elements of financial accounting have been covered. But only four chapters of the 27 concentrate on managerial topics. The text is oriented towards programs desiring a strong financial coverage.

It differs from the usual presentation format in four respects: (1) in its extreme utilization of charts, diagrams, ledger accounts, and statements with arrows, boxes, and various notations enabling students to follow the illustrations step by step, (2) in the illustrative exercises furnished throughout to allow the student to test his/her comprehension of the particular topic (answers are in the back of the book), (3) in the concise manner in which material is explained, and (4) in the opportunity given to observe transactions, financial statements, and changes of business form of "Harry Simpson's Enviro-Cycle Shop."

In summary, there are two possible thoughts on the type of presentation used in this book: (1) the students will skip the valuable charts and diagrams and complete only the reading material, or (2) the students will become accustomed to this method in the beginning of the text and find it a very valuable tool in learning the essentials of accounting. The frequent repetition of points stressed in past chapters with the added outline of material under present consideration, and the final summary at the end of the chapters are invaluable teaching aids. In some cases, the explanations may be too concise. Yet, it provides the beginning student with an overall view of accounting which, too often, may be the only introduction to some topics for the general business student.

The authors have attempted in their unique presentation design to "explain accounting procedures, concepts, and principles in a forthright way." The main objective was to ease the students' task of learning the essentials of accounting. Whether or not this has been accomplished will be determined through evaluations by the beginning students using the text.

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TOM KENNEDY and CHARLES E. SIMON, *An Examination of Questionable Payments and Practices* (New York: Praeger Publishers, 1978, pp. xiii, 416).

The question of corporate ethics and concern about corporate behavior in dealings with foreign and domestic governments or commercial interests is not new. The recent disclosures of large-scale bribery and of other questionable payments and practices, however, have added new urgency to these issues. The Securities and Exchange Commission (SEC) has long been concerned with the problem of adequate disclosure of corporate dealings and questionable practices by firms under its jurisdiction. The Foreign Corrupt Practices Act of 1977 has intensified and formalized such concern by explicitly establishing a corporate obligation to maintain accurate books and records and an adequate system of internal accounting controls for the purpose of preventing or exposing questionable practices.

This book, apparently the outgrowth of commercial research conducted by the firm of Charles E. Simon and Company, describes voluntarily reported sensitive payments and related matters for 109 firms headquartered in the New York, New Jersey, and Connecticut area. Information was collected for an approximately five-year period in the early 1970s. The primary source of the information were documents filed with the SEC during the period. The companies involved in the study are identified by name, and the related source documents are coded.

The book is divided into eight sections and, within each section, into numerous subcategories. The textual material consists primarily of repetitive listings of company names, identified by stock exchange listing, *Fortune* rank, and auditor. In some cases, "special notes" are provided.

The firms covered in the sample are listed in various categories by size, industry, and auditor. The major topics covered in the main body of the book include investigations of questionable payments and practices undertaken by the sampled companies themselves, and some of the results of these investigations are identified and companies using such devices are listed. Officers' and directors' awareness of questionable practices are described, and corporate policy statements relating to these issues are reviewed. Finally, "items of piquant interest" are described, including such categories as "items of random curiosity" and "companies which have disclosed or offered opinions or observations which might strain the credulity of persons less trusting by nature than the authors of this report."

The structure of the topics is well-conceived, and the various categories relate well to the major concerns the issues raise. The book, however, loses much of its usefulness and interest because of its almost complete lack of analysis. This makes it difficult to assess the extent and seriousness of the practices described and to judge their significance. No effort is made to address the key issues analytically or to assess the implications of the reported practices on the future conduct of business.

As a reference, the book lacks completeness. Only about one quarter of the more than 400 companies which reported questionable payments and practices are covered in this study. The use of a coding system for source documents makes an interpretation of the extent and the exact nature of the reported practices and their disclosure very difficult. Some of the whimsical and sarcastic remarks by the authors detract from the objectivity of the study. With a very limited usefulness and appeal for the general reader, it appears not to be suitable as a textbook or reference book for educational purposes.

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GERALD L. LENROW, RALPH MILO, and ANTHONY P. RUA, *Federal Income Taxation of Insurance Companies*, Third Edition (New York: John Wiley & Sons, 1979, pp. xii, 473, $38.95).

Can an insurance company file a consolidated return with non-insurance companies? Is it possible for an insurance corporation to offset ordinary income with net capital losses? Is a bail-bonding company considered to be an insurer for tax purposes?

These are just a few of the questions answered in the second revision of this reference manual on insurance company taxation. The authors, all tax partners with Coopers & Lybrand, have an objective of providing a readily available research tool to be used by both insurance specialists and private practitioners. The book is divided into three major sections, and each of these is briefly discussed below.

The first six chapters review the tax definitions of insurance companies and discuss basic tax principles applicable to all types of insurance companies. The first chapter contains an excellent summary of the case law and legislative statutes which have formed the tax definition of an insurance company. A short history of insurance taxation is also given. Five chapters review the taxation of corporations in general, with occasional reference to items peculiar to insurance companies. Since reference is made to several insurance company provisions in these introductory chapters, some peculiar terms are encountered which are not defined until later in the book. These include "Phase I Income" and "Ceding Commission." When a general overview of an area is given in tax texts, this is a common problem.

Although some may find the extensive corporate tax review unnecessary, this summary does contain several tax planning suggestions not discussed in many sources. For example, proper wording on a Form 870 refund claim can insure maximum recovery in the event of a miscalculation. Additionally, Chapter 3 contains one of the most comprehensive discussions found anywhere on the advantages and disadvantages of filing consolidated returns.

The second major section of the book contains detailed descriptions of the tax computations of stock property and liability companies and mutual property and liability companies. The special tax definitions of investment income, underwriting income, loss reserves, and protection against loss accounts are covered in detail. In most cases, there is a direct relationship between the gross income of an insurance company and the income shown on the annual state regulatory statement. This relationship is discussed in detail, and case law and revenue rulings which have deviated from this principle are summarized.

One strong feature is the thorough discussion of those areas of insurance taxation where statutory law is not well defined. This is accomplished with comprehensive summaries of relevant case law and numerous tax planning examples. Two particularly good discussions are given on the definitions of mutual insurance companies and the Protection Against Loss Accounts.

The final section contains a comprehensive discussion of taxation of life insurance companies, including a discussion of the qualification ratio test for insurance companies, and the three phases of the tax computation for insurance companies (investment income, gain or loss from operations, and distributions to shareholders). The final four chapters cover such special life insurance considerations as reserves, reinsurance, separate accounts, and consolidated returns.

The text is well written and includes thorough discussions of some of the most complex provisions of the Code. The emphasis on tax planning considerations makes this book a valuable reference to anyone involved in insurance company taxation.

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JOSEPH G. LOUDERBACK III and GERALDINE F. DOMINIAK, *Managerial Accounting*, Second Edition (Belmont, California: Prentice-Hall, Inc., 1978, pp. v, 652, $15.95).

Designed primarily for an elementary managerial accounting course for students who have had a course in financial accounting, the flexibility of this book's structure would also permit its use in an undergraduate service course for non-accounting majors as well as in a course for MBA students with little or no accounting background. The topic coverage is standard rather than innovative. The material is oriented to problem solving, is non-theoretical, and requires no higher-level mathematics. Clarity of presentation is the text's major strength.

Its focus is somewhat more detailed than is common. It includes a number of specific topics which are commonly deferred to advanced managerial accounting courses. Considerable attention is paid to process costing and also to how both the FIFO and weighted-average process costing techniques are developed. Another example of unexpected coverage is that of long-term planning, which includes an illustration of the calculation of requirements for long-term financing over a number of years.

Two chapters were added to this edition, one on the statement of changes in financial position and the other on financial statement analysis. The new chapters enable the text to better satisfy the requirements of a service course or an MBA course.

The chapter order is similar to that of many recent elementary managerial accounting texts in which information for decision-making and control are covered initially. Product costing, direct and absorption costing, overhead rates and their impact on the income statement—topics which tend to overwhelm novice accounting students—are presented near the end of the textbook. This order is consistent with the emphasis on the contribution-format income statement throughout.

The primary selling points are the clarity of its narrative and the very competent use of illustrations. A step-by-step approach is used, beginning with very simple illustrations and concepts and progressing to more complex illustrations. Furthermore, one or more solved review problems at the end of each chapter reinforce the students' understanding of the central points of the chapter material.

A good example of the clarity of the step-by-step approach is the development of cost-volume-profit analysis in Chapter 2. The chapter begins with a section devoted to the concept of variable costs, including a simple illustration of the income of a company with no fixed costs. In the next section, the concept of contribution margin is developed. Finally, in the third section, fixed costs are added and the first-section illustration is expanded to include fixed costs. This patient approach is employed throughout most of the book.

A large quantity and a wide variety of assignment material is provided at the end of each chapter. This is classified into four types: questions for discussion, exercises, problems, and cases. Instead of being mere student review guides, the questions address the major concepts covered in the respective chapters. The exercises are brief and cover central points of the chapters without complexities. The problems are more involved and longer than the exercises. The cases are essentially problems focusing on uncertainties and situations where decisions must be made in the face of insufficient information. The quantity and variety of assignment material enable the instructor to select an appropriate combination for widely different types of courses.

The noticeable deficiency of the book occurs in Chapter 14, where the step-by-step development of increasingly complex concepts, a commendable characteristic of the rest of the book, is abandoned. Far too many complex topics are packed into a single chapter. Furthermore, the ordering of the development of these concepts is not well planned. For example, the concept of equivalent units of production is buried in the middle of the same section where manufacturing journal entries are first illustrated. These topics require more systematic and careful development.

Other deficiencies of the book are relatively minor. Two tables in Chapter 16 have extensive typographical errors. Also in this chapter, a discussion of the content and implications of the statement of changes in financial position is promised but not included. In Chapter 12, the unusual nature of the variable overhead spending variance, influenced by both price and quantity deviations, is not adequately explained.

The book does a very good job of assisting the student to understand complex managerial accounting concepts in a simple step-by-step manner. For this reason, it deserves to be considered for adoption for courses in which the student's accounting background is minimal.

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A. THOMPSON MONTGOMERY, *Financial Accounting Information: An Introduction to Its Preparation and Use* (Reading, Massachusetts: Addison-Wesley Publishing Company, 1978, pp. xiv, 657, $14.95).

This new financial accounting text is intended for use in an introductory undergraduate or MBA foundation level course. Its innovative features are a user approach, writing style, and preparer procedures in supplementary sections.

This 17-chapter text introduces financial accounting through a proprietorship balance sheet, proceeds with discussions of the major financial statements, including funds-flow, and concludes with introductions to owners' equity and more advanced measurement and reporting issues. Many chapters begin with simplified "real world" business situations which tend to underscore the relevance of the major issues introduced in the chapters.

Most chapters include: a preview, an overview (summary), list of new vocabulary and concepts, review questions, mini-cases and discussion questions, essential problems, and supplementary problems. Essential problems relate to topical areas specifically introduced within the chapter and supplementary problems for areas not specifically introduced. The problems are ample in number and adequate in topical coverage.

The text emphasizes the student as a user rather than preparer of financial accounting information. The most prominent evidence of this is that only one chapter, the final one, includes illustrative journal entries within the textual material of the chapter. Nine of the remaining chapters reduce journal entry preparation (or other technical detail, *e.g.*, preparation of a statement of changes in financial position) and related problem assignments to separate supplementary sections entitled "preparer procedures" and "preparer problems," respectively. The preparer procedure and problem sections appear after the essential and supplementary problems.

Reducing the preparer procedures to supplemental sections tend to detract from the continuity of the text, which, in all other respects, appears well organized. For example, in the chapter on The Measurement of Liabilities, early extinguishment of debt is discussed within the textual material at pages 352-355; yet the related journal entries are deferred to page 370. Somewhat subtly, however, this potential inconvenience actually points to an advantage of the text, *i.e.*, versatility. Technical detail can be easily ignored in, for example, non-accounting-major MBA foundation courses and easily assigned in, for example, introductory undergraduate courses.

Unlike the somewhat intimidating formal writing style of many accounting texts, the informal "conversational" tone of this one encourages student interest and may gain the confidence of those non-accounting majors who are inclined to endure rather than understand.

Several introductory financial accounting texts are thoughtful, well-organized, and innovative. Montgomery's *Financial Accounting Information* is such a text.

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JACK C. ROBERTSON, *Auditing*, Revised Edition (Dallas: Business Publications Inc., 1979, pp. vii, 732, $17.95).

The masterful integration of many recent auditing practice and theory developments in this revised edition will undoubtedly be appreciated. These developments have not been incorporated by simply adding new segments to existing chapters but are carefully integrated throughout the text. Additionally, the chapters of the earlier edition have been revised and in many cases reorganized in a manner which accomplishes a clearer exposition of the material. The objective of producing a text which provides the student with adequate exposure to current audit technology and procedures while simultaneously providing a foundation for conceptual understanding to help students deal with the fast-changing auditing discipline appears to be successfully carried out in this revised edition.

By emphasizing a decision-making approach to auditors' activities, this text provides a clear discussion of auditing tasks and how they are performed, as well as a thorough understanding of why these tasks are appropriate. Integrating this philosophy with the increasingly accepted transaction-cycle approach to audit procedures results in a "non-traditional" text.

As in the earlier edition, this book is divided into four parts. The first part is introduced by a general discussion of auditing, its setting and problems. These matters are described and dissected from various points of view with increased, but still limited, emphasis on internal and governmental auditing. This is still a text about financial audits performed by independent auditors. The discussion on ethics, legal responsibility and liability is up-to-date, concise, and well-executed. Many additions, such as recent Federal legislation, developments relative to audit committees, detection of fraud, and changed ethics rules on advertising have been incorporated. But detailed interpretations of the AICPA's code of ethics found in the first edition have been deleted.

The second part explores the theory of audit evidence, including the increasingly common emphasis on types and nature of evidence, internal control and rigorous treatment of compliance, and substantive testing. Continued from the first edition is extensive treatment of the computer's role in, and impact on, auditing (two chapters) and extensive treatment of statistical sampling (heavy in two chapters). The addition of discussion of internal control reports and the changing role of internal auditors, and the reframing of material concerning internal controls in EDP operations, are welcome. The statistical chapters on compliance testing and substantive testing have been significantly revised and made more palatable. The latter is sufficiently advanced and improved statistically to preclude utilization of past CPA problems, a practice common throughout the remainder of the text.

The third part provides essentially a transactions-cycle approach to the audit of specific accounts. Improvements in this section over the former edition are substantial. There is a better differentiation in each chapter between compliance and substantive tests. Many comprehensive process flowcharts have been subdivided and integrated into the discussion material, reducing their complexity and heightening understanding. More examples of working paper schedules and condensed audit programs have been presented, giving the user a better perspective of the audit process and evidence accumulation, all of which should reduce students' difficulties with independently generating programs for different transaction cycles.

The final section contains two chapters relating to reports by independent auditors, one devoted to unaudited information and non-opinion reports and one dealing with the substance and direction of potential changes in auditing. All of the material has been updated and improved.

Several "impossible" shortcomings might include: (1) less but still heavy emphasis on public accounting or at least financial auditing (why not replace one procedural chapter with one on "operational" auditing?); (2) lack of clearly stated learning objectives at the beginning of each chapter; (3) somewhat weak consideration of an analytical or overall familiarization review; (4) complex statistical coverage of substantive testing, particularly for an introductory course; and (5) somewhat short presentations on such key areas as management reports, unaudited financial statements, and interim reports.

A fairly extensive set of questions and problems are presented with each chapter, and the limited set of cases has been expanded somewhat; approximately 25 percent of the text is devoted to problem material. Reduction in print size has decreased the size by 30 pages even though material content has been expanded. The coverage of first-course material makes the book adaptable to a semester calendar but would present some problems under a quarter arrangement, unless portions of the material could be carried over into an advanced auditing course. The recent extensive developments in auditing make a two-course sequence with this text appealing.

This is a commendable revision which has significantly updated and clarified portions of an already lucid and rigorous text. The revisions are not cosmetic but have enhanced a well-balanced, practical, and conceptual presentation.

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ROBERT W. SCAPENS, *Accounting in an Inflationary Environment* (London: The Macmillan Press Ltd., 1977, pp. ix, 163, £8.95 hard cover, £3.95 paperback).

The stated objective of this book is to explain the developments which have taken place in recent years in the field of accounting in an inflationary environment. The book is divided into nine chapters and organized to guide the readers through a sequence of significant developments in the accounting profession related to the problems created by inflation. The reader is assumed to have a basic knowledge of financial and managerial accounting, but the book is not written on a technical level.

After a brief introduction, the historical developments from the early 1920s in Germany and France, to more recent times in the United Kingdom and the United States are covered. "Constant Purchasing Power Accounting" is considered in concept and in application. Some very basic notions are addressed, such as the nature of monetary assets and liabilities, and the selection of an index for the restatement process. Examples are concise and easy to follow, and the results of constant purchasing power accounting are compared to those of conventional accounting. In two chapters on "Current Value Accounting," brief discussions of value and income are followed by an introduction to current value accounting. The measurement problems and alternative valuations are considered. The distinction between operating profit and holding gains is illustrated, and several notions of capital maintenance are outlined. Again, examples are easy to follow and recommendations of various official bodies are illustrated.

One chapter deals with financial reporting and is essentially a discussion of the relationships between inflation accounting techniques and various objectives of financial reporting. The need to develop an accounting framework for the examination of such issues as which financial accounting system to use in an inflationary environment is discussed, and a recommendation for such a framework is included. Another chapter considers capital budgeting problems associated with inflation. Techniques for considering price changes, and the appropriate cost of capital in evaluating capital projects, are demonstrated and discussed. There is an appendix explaining compound interest and discounting. The last chapter on planning and control discusses cash flow planning, predicting price changes, budget preparation, and other aspects of financial planning and decision making during periods of inflation. The control process is approached in terms of variance analysis, including price-change variances for the purpose of improving price predictions. An illustration using both current price and expected price to calculate variances is included.

The thoughts and positions of many writers and official bodies dealing with inflation accounting brought together in this book should have wide appeal to both students and practitioners of accounting seeking an explanation of recent developments in the area of inflation accounting.

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GEORGE J. STAUBUS, *Making Accounting Decisions* (Houston: Scholars Book Co., 1977, pp. xxix, 676, $17.50).

This important contribution to the external reporting literature consists of several things, but it is mainly an exposition and defense of the author's version of accounting theory. Staubus is an advocate of current-value accounting, which makes him a member of a very large group of theorists. He is, however, almost alone in adopting discounted future cash flows as the basic concept of value and backing it up with a serious analysis.

Alternative versions of what this book is are (1) a textbook for an undergraduate theory course, (2) a handbook for practicing accountants who are choosing among alternative methods, and (3) a guidebook for rule-making bodies. In all of these roles, as well as a theory monograph, this book should serve quite well except, perhaps, in relation to the decisions of practicing accountants whose options under existing rules often preclude choosing a close current-value surrogate.

The first and last of the 15 chapters stand apart from the main body of the book. Chapter I is a critical description of the state of accounting theory and practice. This chapter sets forth several examples of outrageously bad practices and discusses the failure of company and public accountants to agree on the objectives of financial reporting. Some public accountants who could benefit greatly from this book might never get beyond this chapter which will likely seem to them to be criticism somewhat in the style of Abraham Briloff. This is probably a good way to stimulate the interest of students getting their first exposure to accounting theory, however, and that is likely why it is included here. The last chapter, as Staubus says, "includes several mini essays that break away from the book as a unit" (p. 457).

The usefulness of the book as a text is enhanced by suggestions for further reading and lists of questions following the chapters. Many instructors would be reluctant to adopt a theory text that, like this one, is essentially an exposition of one point of view and does not include an extensive discussion of competing positions. This is remedied to a limited extent by a 178-page appendix of 28 readings which are labeled to indicate the chapter which they supplement.

Staubus, appropriately, begins the exposition of his theory with a study of the objectives of accounting. He sees "decision-usefulness" as overshadowing other objectives, and the decisions of investors as more important to accounting than those of other statement users. The investor's concern is centered on predicting dividends, his future cash flows. This leads to the conclusion that "the stocks of economic resources and obligations that accountants are concerned with are positive and negative cash flow potentials" (p. 102). Financial position, then, is future-oriented: it is "an entity's cash flow potentials, their distribution over time, the relationships between their positive and negative elements, and their risk and uncertainty attributes" (p. 122).

Staubus is very flexible and pragmatic in his recommendations for the actual measurement of assets and liabilities in practice. He is even tolerant of historical cost-based depreciation, but insists that "any surrogate attribute that is measured instead [of cash flow potential] must have a demonstrable relationship to future cash flows" (p. 338).

Those who believe, as does this reviewer, that wealth, assets, and liabilities are best defined in terms of existing measurable attributes, will be uncomfortable with this looking to the future. Staubus perceives certain practical difficulties in measuring cash flow potential, but there are also conceptual difficulties which may be sufficiently serious to invalidate the notion. The Thomas finding of incorrigibility in the allocations of historical cost depreciation applies also to the allocations that are necessary in identifying future cash flows with individual assets. In a fundamental sense, "cash flow potential" may be a notion of something that does not exist for a factory building or an item in a raw materials inventory.

When using future flows rather than market values to define the concepts of assets and liabilities, it can be difficult to decide whether a given prospective flow is related to an asset or to a liability. Often there is no apparent way to settle the matter. Staubus calculates "tax adjusted" market values for assets whose tax basis differs from market. Tax-adjusted market will lie between the amount of market value and the tax basis because of the tax expense or benefit that would result from a sale at market. A market value purist, and probably some discounted cash flow advocates, would treat the prospective tax benefit or expense as an adjustment of the tax liability rather than of the asset.

In discussing income measurement, Staubus takes a middle ground between (1) those who consider the income concept central to the most important thing which accountants do and (2) those who would relegate income to a status of no great concern in accounting theory. He sees income as a change in wealth and the income concept as following from the wealth concept. This is the point of view common to most current value theories. The income concept is well defined, given the concept for measuring assets and liabilities. When assets are defined in terms of current exit or entry market prices, a clear notion of income follows (although some find the notion objectionable). Any fuzziness in defining assets is reflected, or even magnified, in income. Perhaps the difficulties of identifying future cash flows with individual assets have led Staubus to put little stress on income.

The title chosen for this book is somewhat less than satisfactory, partly because it is not very informative about the contents and partly because the "decisions" in the title are different from those in the decision-usefulness objective stressed in the text. The decisions in the title involve a choice of accounting rules and practices, while decision-usefulness relates to the actions of investors and others who use accounting data as input. It is not easy, however, to come up with a reasonably short title that would be likely to be considered an improvement. Perhaps this is a case where a sub-title could have been used to good advantage.

This work will surely be on the reading lists of many theory courses and used as a text in some. It deserves to be given serious attention by all academics and practitioners who are interested in accounting theory and rule-making.

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PHEBE M. WOLTZ and RICHARD T. ARLEN, *College Accounting: An Introduction* (New York: McGraw-Hill, Inc., 1979, pp. vii, 413, $11.95).

Using a very practical, procedural manner to introduce accounting to students interested in "entry-level positions" (p. xv) the book's purpose is to provide a one-semester course for "students pursuing a career in accounting, secretarial, and other business areas as well as fulfilling the needs of non-business majors" (p. xv). Detailed accounting procedures are emphasized, and depth of treatment of topic areas is limited.

The text is organized by selected topics, resulting in 12 chapters and three appendices. Good step-by-step illustrations are given for the recording process, for adjusting entries, and for the work sheet. However, the first chapter gives cursory treatment to accounting concepts, recognizing very briefly only the entity concept and the cost principle. Part I of Chapter 12 covers additional generally accepted accounting principles. Instructors who feel accounting principles should be presented in the early part of the course can start the term with Part I of Chapter 12.

Good treatment is given to the procedural handling of the various special journals, subsidiary ledgers, and control accounts. Through the use of various illustrations and in a step-by-step fashion, students are taken through the process of recording and posting in special journals.

In the chapter on payroll accounting, actual forms are reproduced, such as Form W-4, Form 941, Form 1099, Form 940, and Form W-2. In the case of Form 941, detailed instructions are given the student in how to prepare this statement. Other payroll records are also given practical treatment.

In the chapter covering plant assets, the authors take a different position from APB Opinion No. 29, "Accounting for Nonmonetary Transactions," in their treatment of a trade-in of a plant asset. The authors provide an example (pp. 307-308) of a trade-in of a plant asset for a similar plant asset (a van). Cash is given in the trade-in, and a gain is recorded on the exchange. In exchanges of similar productive assets, according to APB Opinion No. 29, gains are not recognized by the party giving the "boot," *i.e.*, cash.

Limited treatment is given to topic areas in three appendices: pegboard accounting, intangible assets, and notes and interest.

There are three distinctive characteristics of this book. Learning objectives, which have ained increased recognition as an effective edagogical tool, are stated at the beginning of ch chapter and each appendix. A sufficient nber of learning objectives is provided to ver the material presented. A glossary of terms l with definitions, is given at the end of each pter. A checklist of key figures is given on the inside front and back covers. At the end of each chapter are questions, usually ten exercises, and usually ten problems which vary in rigor from easy to more difficult.

This easy-to-read introductory text provides a practical approach, uses a variety of illustrations in each topic area, and emphasizes detail and procedures. It would be an excellent choice for students in need of the skills in basic accounting procedures required in entry-level positions in service or merchandising concerns.

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Professional Firm Publications

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This is the fifth of a new series designed to highlight accounting firms' publications of possible interest to academics. In recent years, the largest public accounting firms have increased the quantity and quality of their accounting publications. Single copies are usually available upon request from the nearest office.

Disclosing Relations with Independent Accountants, published by Arthur Young & Company (1978), provides a discussion of and guidelines for complying with the disclosure requirements of ASR 250. Illustrative examples of required proxy disclosures as well as the text of ASR 250 are provided (42 pages).

Ernst & Ernst's *Financial Reporting Developments* is a two-volume set that provides a compilation of all of the firm's *Financial Reporting Developments* issued between 1973 and August 1978 that are still in effect. One volume covers 12 FASB Statements and two APB Opinions. The other volume covers 14 SEC releases and the Foreign Corrupt Practices Act. The coverage is based upon original pronouncements; no updating has been undertaken for subsequent pronouncements (776 pages).

Ernst & Ernst's *Social Responsibility Disclosure —1978 Survey* is a continuation of their yearly survey of annual reports. Included in the 1978 survey are the *Fortune* 500 Industrials, 50 Life Insurance companies, and 50 Commercial Banks. The survey provides an overview of the results, a discussion of the methodology illustrative examples, and a comprehensive reporting of results by firm and industry (136 pages).

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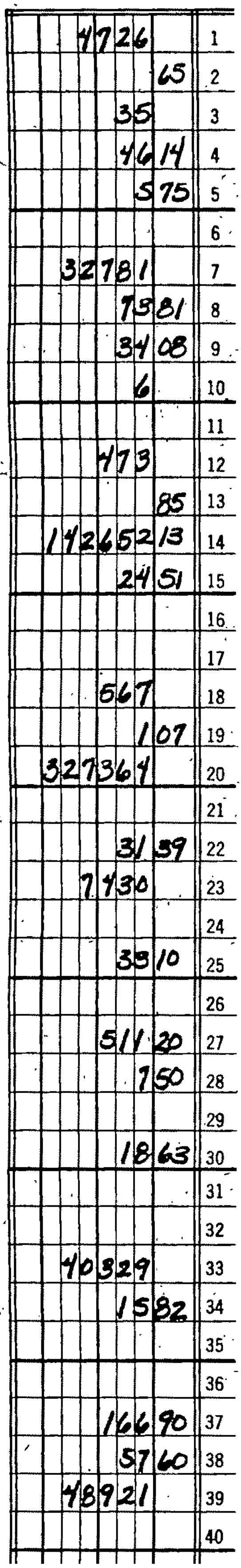

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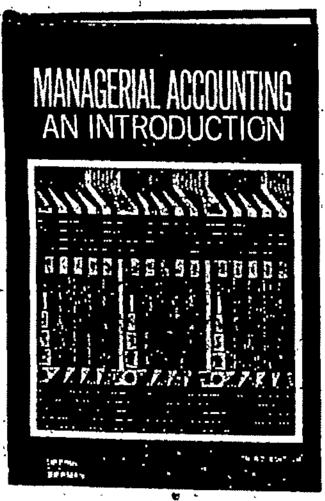

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2) to set forth a conceptual and pragmatic framework for enhancing accounting knowledge, education and practices in Third World economies.
3) to assess the role of educational institutions throughout the world in disseminating accounting know-how and expertise for developing economies.
4) to suggest how assistance may be given to Third World countries by way of effective educational, training, and research programs in conjunction with local, regional, and international educational, institutional, and development bodies.

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This book, the publication of which has been generously financed by the Price Waterhouse Foundation, will be of particular relevance for educational institutions, governments, development agencies and others in Third World countries, and the distribution will be going to these entities in developing economies. Members of the AAA may obtain one copy at no charge by writing to the American Accounting Association, 5717 Bessie Drive, Sarasota, FL 33583.

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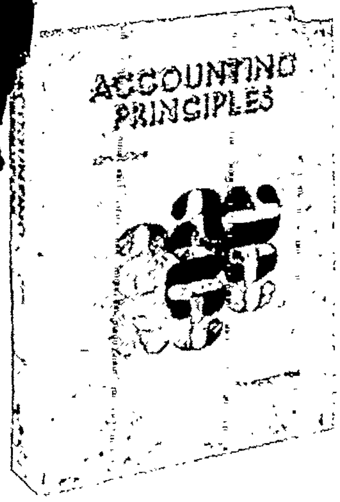

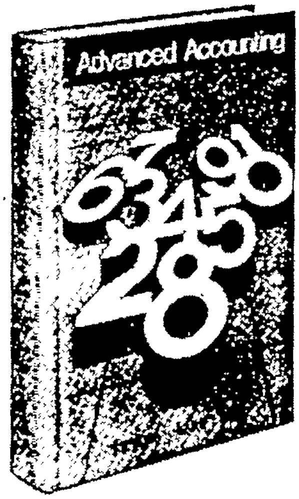

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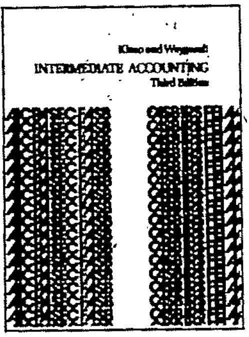

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